Uncertainty of channel	CR_1^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	7127.54	0.46	252.75	1.86	14.04	0.02	0.68	21.47	0.77	37.61	5544.34	1253.55
Total background error	±725.66	±0.46	±55.25	±0.27	±29.20	±0.10	±1.53	±4.84	±0.79	±29.40	±698.04	±126.02
α_syst$t\bar{t}$Xsec	±554.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±554.43	±0.00
Jet energy scale	±389.03	±0.03	±17.86	±0.19	±0.82	±0.00	±0.09	±0.71	±0.00	±3.07	±366.25	±0.00
α_$t\bar{t}$ISRFSR	±166.42	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±166.42	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±120.91	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±120.91
α_$t\bar{t}$GenPlusPS	±83.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±83.00	±0.00
CellOut energy scale	±78.76	±0.01	±2.51	±0.01	±0.14	±0.00	±0.06	±0.05	±0.00	±0.41	±75.57	±0.00
α_PileUp	±57.49	±0.02	±0.80	±0.02	±0.17	±0.00	±0.07	±0.03	±0.18	±2.83	±53.65	±0.00
α_systWtXsec	±50.55	±0.00	±50.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±44.43	±0.01	±2.47	±0.02	±0.26	±0.00	±0.00	±0.01	±0.00	±0.08	±41.58	±0.00
Lumi	±44.33	±0.01	±7.08	±0.05	±0.39	±0.00	±0.02	±0.60	±0.02	±1.05	±0.00	±35.10
α_WWGenerator	±29.16	±0.00	±0.00	±0.00	±29.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±27.99	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±27.99	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±26.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±26.50	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±10.50	±0.00	±10.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±8.28	±0.01	±1.65	±0.13	±0.42	±0.01	±0.09	±0.19	±0.00	±3.12	±10.00	±0.00
α_syst$Z$Xsec	±5.64	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.64	±0.00	±0.00
α_$Fakes$Syst	±5.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.41
α_systTplusXsec	±4.72	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.72	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±4.54	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.54	±0.00	±0.00
CellOut energy resolution	±2.67	±0.00	±1.23	±0.04	±0.28	±0.00	±0.08	±0.07	±0.00	±0.21	±3.65	±0.00
α_WZGenerator	±1.51	±0.00	±0.00	±0.00	±0.00	±0.00	±1.51	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.77	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.77	±0.00	±0.00	±0.00
α_systWWXsec	±0.70	±0.00	±0.00	±0.00	±0.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.66	±0.00	±0.00	±0.00	±0.66	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.55	±0.00
α_systtZXsec	±0.46	±0.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.41	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.13	±0.00	±0.00	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.10	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 1: Breakdown of the dominant systematic uncertainties on background estimates in CR_1^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_1^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	5543.24	0.46	252.73	1.86	14.12	0.02	0.68	21.47	0.37	37.59	3960.37	1253.58
Total background error	±75.11	±0.46	±54.81	±0.27	±29.20	±0.10	±1.52	±4.80	±0.67	±29.21	±165.51	±125.24
mu_$t\bar{t}$DF	±538.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±538.33	±0.00
α_syst$t\bar{t}$Xsec	±391.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±391.05	±0.00
Jet energy scale	±281.86	±0.03	±17.70	±0.18	±0.81	±0.00	±0.09	±0.70	±0.00	±3.05	±259.29	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±120.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±120.16
α_$t\bar{t}$ISRFSR	±119.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±119.73	±0.00
α_$t\bar{t}$GenPlusPS	±58.91	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±58.91	±0.00
CellOut energy scale	±56.88	±0.01	±2.49	±0.01	±0.14	±0.00	±0.06	±0.05	±0.00	±0.41	±53.70	±0.00
α_systWtXsec	±50.15	±0.00	±50.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±44.11	±0.01	±7.04	±0.05	±0.39	±0.00	±0.02	±0.60	±0.01	±1.05	±0.00	±34.94
α_PileUp	±41.80	±0.02	±0.79	±0.02	±0.17	±0.00	±0.07	±0.03	±0.09	±2.81	±38.08	±0.00
α_JVF	±32.29	±0.01	±2.44	±0.02	±0.26	±0.00	±0.00	±0.01	±0.00	±0.08	±29.46	±0.00
α_WWGenerator	±29.16	±0.00	±0.00	±0.00	±29.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±27.80	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±27.80	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±18.82	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±18.82	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±10.44	±0.00	±10.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±5.60	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.60	±0.00	±0.00
Jet energy resolution	±5.38	±0.01	±1.64	±0.13	±0.42	±0.01	±0.09	±0.19	±0.00	±3.10	±7.10	±0.00
α_$Fakes$Syst	±5.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.37
α_systTplusXsec	±4.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.69	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±4.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.52	±0.00	±0.00
CellOut energy resolution	±1.62	±0.00	±1.22	±0.04	±0.28	±0.00	±0.08	±0.07	±0.00	±0.21	±2.59	±0.00
α_WZGenerator	±1.50	±0.00	±0.00	±0.00	±0.00	±0.00	±1.50	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.70	±0.00	±0.00	±0.00	±0.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.67	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.66	±0.00	±0.00	±0.00	±0.66	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.45	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.41	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.13	±0.00	±0.00	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.10	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 2: Breakdown of the dominant systematic uncertainties on background estimates in CR_1^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_2^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	7133.62	0.46	253.73	1.86	13.99	0.02	0.67	21.52	0.77	37.89	5540.04	1262.67
Total background error	±725.39	±0.46	±55.49	±0.27	±29.19	±0.10	±1.49	±4.85	±0.79	±29.78	±697.79	±126.48
α_syst$t\bar{t}$Xsec	±554.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±554.00	±0.00
Jet energy scale	±388.44	±0.03	±18.03	±0.19	±0.82	±0.00	±0.09	±0.75	±0.00	±2.68	±365.85	±0.00
α_$t\bar{t}$ISRFSR	±168.72	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±168.72	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±121.31	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±121.31
α_$t\bar{t}$GenPlusPS	±81.86	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±81.86	±0.00
CellOut energy scale	±78.28	±0.01	±2.68	±0.01	±0.12	±0.00	±0.07	±0.07	±0.00	±0.25	±75.08	±0.00
α_PileUp	±56.87	±0.02	±0.52	±0.02	±0.16	±0.00	±0.07	±0.04	±0.18	±2.94	±53.23	±0.00
α_systWtXsec	±50.75	±0.00	±50.75	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±44.62	±0.01	±7.10	±0.05	±0.39	±0.00	±0.02	±0.60	±0.02	±1.06	±0.00	±35.35
α_JVF	±44.36	±0.01	±2.55	±0.02	±0.26	±0.00	±0.00	±0.01	±0.00	±0.14	±41.38	±0.00
α_WWGenerator	±29.16	±0.00	±0.00	±0.00	±29.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±28.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±28.27	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±26.48	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±26.48	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±10.54	±0.00	±10.54	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±5.81	±0.01	±1.09	±0.13	±0.44	±0.01	±0.03	±0.16	±0.00	±4.19	±9.28	±0.00
α_syst$Z$Xsec	±5.68	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.68	±0.00	±0.00
α_$Fakes$Syst	±5.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.43
α_systTplusXsec	±4.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.73	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±4.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.55	±0.00	±0.00
α_WZGenerator	±1.48	±0.00	±0.00	±0.00	±0.00	±0.00	±1.48	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±1.37	±0.00	±1.54	±0.04	±0.28	±0.00	±0.08	±0.04	±0.00	±0.34	±2.81	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.77	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.77	±0.00	±0.00	±0.00
α_systWWXsec	±0.70	±0.00	±0.00	±0.00	±0.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.66	±0.00	±0.00	±0.00	±0.66	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.55	±0.00
α_systtZXsec	±0.46	±0.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.41	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.13	±0.00	±0.00	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.10	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 3: Breakdown of the dominant systematic uncertainties on background estimates in CR_2^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_2^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	5559.87	0.46	253.71	1.86	14.11	0.02	0.67	21.52	0.37	37.86	3966.55	1262.74
Total background error	±75.28	±0.46	±55.03	±0.27	±29.27	±0.10	±1.49	±4.82	±0.67	±29.59	±166.09	±125.71
mu_$t\bar{t}$DF	±537.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±537.41	±0.00
α_syst$t\bar{t}$Xsec	±390.31	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±390.31	±0.00
Jet energy scale	±281.32	±0.03	±17.82	±0.18	±0.81	±0.00	±0.09	±0.74	±0.00	±2.65	±258.99	±0.00
α_$t\bar{t}$ISRFSR	±122.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±122.23	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±120.56	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±120.56
α_$t\bar{t}$GenPlusPS	±58.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±58.24	±0.00
CellOut energy scale	±56.70	±0.01	±2.67	±0.01	±0.12	±0.00	±0.07	±0.07	±0.00	±0.25	±53.52	±0.00
α_systWtXsec	±50.33	±0.00	±50.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±44.41	±0.01	±7.07	±0.05	±0.39	±0.00	±0.02	±0.60	±0.01	±1.06	±0.00	±35.19
α_PileUp	±41.40	±0.02	±0.52	±0.02	±0.16	±0.00	±0.07	±0.04	±0.08	±2.92	±37.87	±0.00
α_JVF	±32.30	±0.01	±2.52	±0.02	±0.26	±0.00	±0.00	±0.01	±0.00	±0.14	±29.35	±0.00
α_WWGenerator	±29.23	±0.00	±0.00	±0.00	±29.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±28.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±28.08	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±18.85	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±18.85	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±10.48	±0.00	±10.48	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±5.64	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.64	±0.00	±0.00
α_$Fakes$Syst	±5.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.39
α_systTplusXsec	±4.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.70	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±4.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.52	±0.00	±0.00
Jet energy resolution	±3.16	±0.01	±1.08	±0.13	±0.44	±0.01	±0.03	±0.16	±0.00	±4.16	±6.60	±0.00
α_WZGenerator	±1.47	±0.00	±0.00	±0.00	±0.00	±0.00	±1.47	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.70	±0.00	±0.00	±0.00	±0.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.67	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.66	±0.00	±0.00	±0.00	±0.66	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.57	±0.00	±1.53	±0.04	±0.28	±0.00	±0.08	±0.04	±0.00	±0.34	±2.00	±0.00
α_systtZXsec	±0.45	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.41	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.13	±0.00	±0.00	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.10	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 4: Breakdown of the dominant systematic uncertainties on background estimates in CR_2^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_3^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	7196.17	0.46	255.05	1.86	14.03	0.03	0.79	21.95	0.77	40.22	5580.19	1280.82
Total background error	±732.23	±0.46	±55.37	±0.27	±29.39	±0.10	±1.58	±4.95	±0.79	±32.01	±704.67	±127.39
α_syst$t\bar{t}$Xsec	±558.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±558.02	±0.00
Jet energy scale	±394.83	±0.03	±16.90	±0.19	±0.82	±0.00	±0.09	±0.77	±0.00	±3.17	±372.88	±0.00
α_$t\bar{t}$ISRFSR	±166.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±166.04	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±122.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±122.12
α_$t\bar{t}$GenPlusPS	±85.17	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±85.17	±0.00
CellOut energy scale	±79.31	±0.01	±2.49	±0.01	±0.13	±0.00	±0.07	±0.06	±0.00	±0.32	±76.23	±0.00
α_PileUp	±58.09	±0.02	±1.15	±0.02	±0.16	±0.00	±0.07	±0.05	±0.18	±2.98	±53.78	±0.00
α_systWtXsec	±51.01	±0.00	±51.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±45.25	±0.01	±7.14	±0.05	±0.39	±0.00	±0.02	±0.61	±0.02	±1.13	±0.00	±35.86
α_JVF	±44.86	±0.01	±2.55	±0.02	±0.26	±0.00	±0.00	±0.01	±0.00	±0.17	±41.85	±0.00
α_ZGenerator	±30.60	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±30.60	±0.00	±0.00
α_WWGenerator	±29.35	±0.00	±0.00	±0.00	±29.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±26.59	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±26.59	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±10.59	±0.00	±10.59	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±8.55	±0.01	±0.31	±0.13	±0.43	±0.01	±0.01	±0.22	±0.00	±3.26	±11.81	±0.00
α_syst$Z$Xsec	±6.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.03	±0.00	±0.00
α_$Fakes$Syst	±5.47	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.47
α_systTplusXsec	±4.83	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.83	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±4.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.58	±0.00	±0.00
CellOut energy resolution	±3.73	±0.00	±1.13	±0.04	±0.28	±0.00	±0.08	±0.11	±0.00	±0.10	±4.25	±0.00
α_WZGenerator	±1.56	±0.00	±0.00	±0.00	±0.00	±0.00	±1.56	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.77	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.77	±0.00	±0.00	±0.00
α_systWWXsec	±0.70	±0.00	±0.00	±0.00	±0.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.66	±0.00	±0.00	±0.00	±0.66	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.56	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.56	±0.00
α_systtZXsec	±0.46	±0.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.42	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.42	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.13	±0.00	±0.00	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.10	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 5: Breakdown of the dominant systematic uncertainties on background estimates in CR_3^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_3^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	5605.73	0.46	255.18	1.86	13.89	0.02	0.79	21.96	0.37	40.26	3990.16	1280.78
Total background error	±75.65	±0.46	±54.93	±0.27	±29.30	±0.10	±1.57	±4.92	±0.67	±31.81	±167.39	±126.62
mu_$t\bar{t}$DF	±540.34	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±540.34	±0.00
α_syst$t\bar{t}$Xsec	±391.97	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±391.97	±0.00
Jet energy scale	±285.36	±0.03	±16.70	±0.18	±0.81	±0.00	±0.09	±0.76	±0.00	±3.12	±263.66	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±121.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±121.36
α_$t\bar{t}$ISRFSR	±119.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±119.70	±0.00
α_$t\bar{t}$GenPlusPS	±60.49	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±60.49	±0.00
CellOut energy scale	±57.34	±0.01	±2.48	±0.01	±0.13	±0.00	±0.07	±0.06	±0.00	±0.32	±54.27	±0.00
α_systWtXsec	±50.60	±0.00	±50.60	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±45.03	±0.01	±7.11	±0.05	±0.39	±0.00	±0.02	±0.61	±0.01	±1.12	±0.00	±35.70
α_PileUp	±42.39	±0.02	±1.15	±0.02	±0.16	±0.00	±0.07	±0.05	±0.09	±2.96	±38.20	±0.00
α_JVF	±32.61	±0.01	±2.52	±0.02	±0.26	±0.00	±0.00	±0.01	±0.00	±0.17	±29.63	±0.00
α_ZGenerator	±30.40	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±30.40	±0.00	±0.00
α_WWGenerator	±29.26	±0.00	±0.00	±0.00	±29.26	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±18.90	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±18.90	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±10.53	±0.00	±10.53	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±6.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.00	±0.00	±0.00
α_$Fakes$Syst	±5.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.44
Jet energy resolution	±5.15	±0.01	±0.31	±0.13	±0.43	±0.01	±0.01	±0.21	±0.00	±3.24	±8.39	±0.00
α_systTplusXsec	±4.80	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.80	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±4.56	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.56	±0.00	±0.00
CellOut energy resolution	±2.50	±0.00	±1.13	±0.04	±0.28	±0.00	±0.08	±0.11	±0.00	±0.10	±3.02	±0.00
α_WZGenerator	±1.55	±0.00	±0.00	±0.00	±0.00	±0.00	±1.55	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.69	±0.00	±0.00	±0.00	±0.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.67	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.65	±0.00	±0.00	±0.00	±0.65	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.46	±0.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.42	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.42	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.13	±0.00	±0.00	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.10	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 6: Breakdown of the dominant systematic uncertainties on background estimates in CR_3^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_4^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	2474.07	0.39	125.66	3.48	83.11	0.14	7.04	13.89	0.00	90.54	2149.82	0.00
Total background error	±381.48	±0.39	±29.52	±0.52	±25.31	±0.04	±1.04	±3.27	±0.00	±44.36	±358.22	±0.00
Jet energy scale	±222.30	±0.03	±10.18	±0.45	±5.94	±0.00	±0.52	±0.75	±0.00	±10.46	±193.96	±0.00
α_syst$t\bar{t}$Xsec	±214.98	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±214.98	±0.00
α_$t\bar{t}$ISRFSR	±152.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±152.69	±0.00
α_$t\bar{t}$PartonShower	±85.99	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±85.99	±0.00
α_$t\bar{t}$Generator	±76.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±76.13	±0.00
α_trigger	±74.22	±0.01	±3.77	±0.10	±2.49	±0.00	±0.21	±0.42	±0.00	±2.72	±64.49	±0.00
Jet energy resolution	±43.73	±0.01	±5.80	±0.03	±0.79	±0.02	±0.01	±0.59	±0.00	±2.66	±40.80	±0.00
CellOut energy scale	±42.80	±0.01	±3.71	±0.02	±0.63	±0.00	±0.04	±0.02	±0.00	±0.96	±37.45	±0.00
α_ZGenerator	±40.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±40.45	±0.00	±0.00
α_systWtXsec	±25.13	±0.00	±25.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±23.86	±0.00	±0.00	±0.00	±23.86	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±19.96	±0.00	±1.50	±0.01	±1.83	±0.00	±0.11	±0.00	±0.00	±0.61	±15.87	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±16.81	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±16.81	±0.00
α_PileUp	±15.45	±0.00	±0.08	±0.01	±0.15	±0.00	±0.25	±0.13	±0.00	±0.84	±14.51	±0.00
α_syst$Z$Xsec	±13.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±13.58	±0.00	±0.00
Lumi	±9.08	±0.01	±3.52	±0.10	±2.33	±0.00	±0.20	±0.39	±0.00	±2.54	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±7.75	±0.00	±7.75	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±4.16	±0.00	±0.00	±0.00	±4.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±3.92	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.92	±0.00	±0.00
α_systTplusXsec	±3.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.06	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±2.27	±0.01	±0.03	±0.02	±0.51	±0.00	±0.00	±0.13	±0.00	±0.25	±2.19	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±1.61	±0.00	±0.00	±0.00	±1.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.53	±0.00	±0.00	±0.00	±0.00	±0.00	±0.53	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.49	±0.00	±0.00	±0.00	±0.00	±0.00	±0.49	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.39	±0.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.34	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.34	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.21	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.03	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 7: Breakdown of the dominant systematic uncertainties on background estimates in CR_4^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_4^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	2281.01	0.39	125.66	3.48	83.12	0.14	7.04	13.89	0.00	90.54	1956.76	0.00
Total background error	±118.54	±0.39	±29.33	±0.52	±25.14	±0.04	±1.03	±3.25	±0.00	±44.07	±135.37	±0.00
mu_$t\bar{t}$DF	±326.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±326.61	±0.00
Jet energy scale	±203.83	±0.03	±10.12	±0.45	±5.91	±0.00	±0.51	±0.75	±0.00	±10.40	±175.65	±0.00
α_syst$t\bar{t}$Xsec	±194.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±194.39	±0.00
α_$t\bar{t}$ISRFSR	±110.88	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±110.88	±0.00
α_$t\bar{t}$PartonShower	±77.75	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±77.75	±0.00
α_$t\bar{t}$Generator	±68.85	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±68.85	±0.00
α_trigger	±67.97	±0.01	±3.74	±0.10	±2.48	±0.00	±0.21	±0.41	±0.00	±2.70	±58.31	±0.00
α_ZGenerator	±40.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±40.18	±0.00	±0.00
Jet energy resolution	±39.80	±0.01	±5.76	±0.03	±0.79	±0.02	±0.01	±0.59	±0.00	±2.64	±36.90	±0.00
CellOut energy scale	±39.18	±0.01	±3.69	±0.02	±0.63	±0.00	±0.04	±0.02	±0.00	±0.95	±33.87	±0.00
α_systWtXsec	±24.96	±0.00	±24.96	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±23.70	±0.00	±0.00	±0.00	±23.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±18.42	±0.00	±1.49	±0.01	±1.82	±0.00	±0.11	±0.00	±0.00	±0.61	±14.36	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±15.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±15.22	±0.00
α_PileUp	±14.06	±0.00	±0.08	±0.01	±0.15	±0.00	±0.25	±0.13	±0.00	±0.83	±13.12	±0.00
α_syst$Z$Xsec	±13.49	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±13.49	±0.00	±0.00
Lumi	±9.04	±0.01	±3.50	±0.10	±2.32	±0.00	±0.20	±0.39	±0.00	±2.52	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±7.71	±0.00	±7.71	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±4.13	±0.00	±0.00	±0.00	±4.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±3.90	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.90	±0.00	±0.00
α_systTplusXsec	±3.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.04	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±2.06	±0.01	±0.03	±0.02	±0.51	±0.00	±0.00	±0.13	±0.00	±0.25	±1.98	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±1.60	±0.00	±0.00	±0.00	±1.60	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.49	±0.00	±0.00	±0.00	±0.00	±0.00	±0.49	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.38	±0.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.34	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.34	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.21	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.03	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 8: Breakdown of the dominant systematic uncertainties on background estimates in CR_4^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_5^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	270.32	0.02	16.71	0.18	14.41	0.01	0.75	1.58	0.00	1.03	235.62	0.00
Total background error	±39.34	±0.02	±4.78	±0.06	±6.39	±0.02	±0.87	±0.38	±0.00	±1.06	±38.55	±0.00
α_syst$t\bar{t}$Xsec	±23.56	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±23.56	±0.00
α_$t\bar{t}$Generator	±17.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±17.67	±0.00
CellOut energy scale	±14.19	±0.00	±0.64	±0.01	±0.22	±0.00	±0.04	±0.02	±0.00	±0.01	±14.63	±0.00
α_$t\bar{t}$ISRFSR	±10.71	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±10.71	±0.00
α_$t\bar{t}$PartonShower	±9.42	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±9.42	±0.00
α_trigger	±8.11	±0.00	±0.50	±0.01	±0.43	±0.00	±0.02	±0.05	±0.00	±0.03	±7.07	±0.00
Jet energy resolution	±7.32	±0.01	±0.24	±0.01	±0.72	±0.00	±0.09	±0.08	±0.00	±0.03	±8.40	±0.00
α_PileUp	±7.23	±0.00	±0.08	±0.00	±0.30	±0.00	±0.03	±0.01	±0.00	±0.04	±6.86	±0.00
α_WWGenerator	±6.13	±0.00	±0.00	±0.00	±6.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±5.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.50	±0.00
α_systWtXsec	±3.34	±0.00	±3.34	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±2.86	±0.00	±2.86	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±2.34	±0.00	±0.41	±0.00	±0.37	±0.00	±0.01	±0.00	±0.00	±0.01	±1.54	±0.00
CellOut energy resolution	±2.30	±0.00	±1.55	±0.00	±0.27	±0.00	±0.10	±0.00	±0.00	±0.05	±0.97	±0.00
Jet energy scale	±1.33	±0.00	±0.02	±0.04	±1.05	±0.00	±0.06	±0.01	±0.00	±0.16	±0.14	±0.00
α_ZGenerator	±1.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.03	±0.00	±0.00
Lumi	±0.97	±0.00	±0.47	±0.01	±0.40	±0.00	±0.02	±0.04	±0.00	±0.03	±0.00	±0.00
α_WZGenerator	±0.83	±0.00	±0.00	±0.00	±0.00	±0.00	±0.83	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.72	±0.00	±0.00	±0.00	±0.72	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.67	±0.00	±0.00	±0.00	±0.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.35	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.19	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00
α_systWZXsec	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00
α_systtZXsec	±0.02	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 9: Breakdown of the dominant systematic uncertainties on background estimates in CR_5^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_5^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	311.09	0.02	16.72	0.18	14.41	0.01	0.75	1.58	0.00	1.03	276.38	0.00
Total background error	±18.47	±0.02	±4.75	±0.06	±6.35	±0.01	±0.86	±0.38	±0.00	±1.05	±20.22	±0.00
mu_$t\bar{t}$DF	±48.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±48.00	±0.00
α_syst$t\bar{t}$Xsec	±27.48	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±27.48	±0.00
α_$t\bar{t}$Generator	±20.59	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±20.59	±0.00
CellOut energy scale	±16.60	±0.00	±0.64	±0.01	±0.22	±0.00	±0.04	±0.02	±0.00	±0.01	±17.05	±0.00
α_$t\bar{t}$PartonShower	±10.98	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±10.98	±0.00
α_$t\bar{t}$ISRFSR	±10.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±10.38	±0.00
α_trigger	±9.27	±0.00	±0.50	±0.01	±0.43	±0.00	±0.02	±0.05	±0.00	±0.03	±8.24	±0.00
Jet energy resolution	±8.71	±0.01	±0.23	±0.01	±0.72	±0.00	±0.09	±0.07	±0.00	±0.03	±9.78	±0.00
α_PileUp	±8.36	±0.00	±0.08	±0.00	±0.30	±0.00	±0.03	±0.01	±0.00	±0.04	±7.99	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±6.42	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.42	±0.00
α_WWGenerator	±6.09	±0.00	±0.00	±0.00	±6.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±3.32	±0.00	±3.32	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±2.84	±0.00	±2.84	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±2.59	±0.00	±0.41	±0.00	±0.37	±0.00	±0.01	±0.00	±0.00	±0.01	±1.79	±0.00
CellOut energy resolution	±2.45	±0.00	±1.54	±0.00	±0.27	±0.00	±0.10	±0.00	±0.00	±0.05	±1.12	±0.00
Jet energy scale	±1.35	±0.00	±0.02	±0.04	±1.04	±0.00	±0.06	±0.01	±0.00	±0.16	±0.16	±0.00
α_ZGenerator	±1.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.03	±0.00	±0.00
Lumi	±0.97	±0.00	±0.47	±0.01	±0.40	±0.00	±0.02	±0.04	±0.00	±0.03	±0.00	±0.00
α_WZGenerator	±0.82	±0.00	±0.00	±0.00	±0.00	±0.00	±0.82	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.72	±0.00	±0.00	±0.00	±0.72	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.67	±0.00	±0.00	±0.00	±0.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.34	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.34	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.19	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00
α_systWZXsec	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.02	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 10: Breakdown of the dominant systematic uncertainties on background estimates in CR_5^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_6^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	379.71	0.05	29.62	0.64	27.23	0.04	1.92	2.80	0.00	6.00	311.43	0.00
Total background error	±79.99	±0.05	±7.84	±0.20	±10.78	±0.03	±0.62	±0.69	±0.00	±8.58	±76.22	±0.00
α_$t\bar{t}$ISRFSR	±58.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±58.44	±0.00
α_syst$t\bar{t}$Xsec	±31.14	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±31.14	±0.00
Jet energy scale	±25.74	±0.01	±3.13	±0.08	±1.56	±0.00	±0.09	±0.18	±0.00	±0.97	±19.71	±0.00
α_$t\bar{t}$Generator	±23.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±23.21	±0.00
α_$t\bar{t}$PartonShower	±12.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±12.46	±0.00
CellOut energy scale	±11.92	±0.00	±0.88	±0.01	±0.40	±0.00	±0.05	±0.03	±0.00	±0.08	±10.74	±0.00
α_trigger	±11.39	±0.00	±0.89	±0.02	±0.82	±0.00	±0.06	±0.08	±0.00	±0.18	±9.34	±0.00
α_WWGenerator	±10.44	±0.00	±0.00	±0.00	±10.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±8.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±8.45	±0.00	±0.00
Jet energy resolution	±7.04	±0.00	±0.46	±0.15	±0.23	±0.00	±0.20	±0.16	±0.00	±0.18	±7.29	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±6.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.45	±0.00
α_PileUp	±6.31	±0.01	±0.45	±0.01	±0.15	±0.00	±0.05	±0.01	±0.00	±0.06	±5.83	±0.00
α_systWtXsec	±5.92	±0.00	±5.92	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±3.58	±0.00	±3.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±3.18	±0.00	±0.70	±0.00	±0.63	±0.00	±0.01	±0.00	±0.00	±0.05	±1.79	±0.00
CellOut energy resolution	±2.70	±0.00	±0.69	±0.03	±0.44	±0.00	±0.29	±0.08	±0.00	±0.41	±2.77	±0.00
Lumi	±1.91	±0.00	±0.83	±0.02	±0.76	±0.00	±0.05	±0.08	±0.00	±0.17	±0.00	±0.00
α_systWWXsec	±1.36	±0.00	±0.00	±0.00	±1.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.93	±0.00	±0.00	±0.00	±0.93	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.90	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.90	±0.00	±0.00
α_systTplusXsec	±0.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.61	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.38	±0.00	±0.00
α_WZGenerator	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.30	±0.00	±0.00	±0.00	±0.00	±0.00	±0.30	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.10	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.05	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00
α_ZZGenerator	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 11: Breakdown of the dominant systematic uncertainties on background estimates in CR_6^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_6^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	498.66	0.05	29.58	0.64	27.18	0.04	1.92	2.79	0.00	5.97	430.48	0.00
Total background error	±27.62	±0.05	±7.81	±0.20	±10.71	±0.03	±0.61	±0.69	±0.00	±8.47	±32.27	±0.00
mu_$t\bar{t}$DF	±116.96	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±116.96	±0.00
α_$t\bar{t}$ISRFSR	±102.92	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±102.92	±0.00
α_syst$t\bar{t}$Xsec	±43.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±43.13	±0.00
Jet energy scale	±33.39	±0.01	±3.19	±0.08	±1.58	±0.00	±0.10	±0.18	±0.00	±0.98	±27.27	±0.00
α_$t\bar{t}$Generator	±31.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±31.61	±0.00
α_$t\bar{t}$PartonShower	±17.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±17.13	±0.00
CellOut energy scale	±15.58	±0.00	±0.86	±0.01	±0.39	±0.00	±0.05	±0.03	±0.00	±0.07	±14.43	±0.00
α_trigger	±14.87	±0.00	±0.88	±0.02	±0.81	±0.00	±0.06	±0.08	±0.00	±0.18	±12.84	±0.00
α_WWGenerator	±10.37	±0.00	±0.00	±0.00	±10.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±9.65	±0.00	±0.46	±0.15	±0.22	±0.00	±0.20	±0.16	±0.00	±0.17	±9.90	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±8.87	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±8.87	±0.00
α_PileUp	±8.39	±0.01	±0.45	±0.01	±0.15	±0.00	±0.05	±0.01	±0.00	±0.06	±7.91	±0.00
α_ZGenerator	±8.34	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±8.34	±0.00	±0.00
α_systWtXsec	±5.88	±0.00	±5.88	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±3.82	±0.00	±0.70	±0.00	±0.63	±0.00	±0.01	±0.00	±0.00	±0.05	±2.44	±0.00
CellOut energy resolution	±3.70	±0.00	±0.69	±0.03	±0.44	±0.00	±0.28	±0.08	±0.00	±0.41	±3.76	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±3.56	±0.00	±3.56	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±1.90	±0.00	±0.82	±0.02	±0.76	±0.00	±0.05	±0.08	±0.00	±0.17	±0.00	±0.00
α_systWWXsec	±1.35	±0.00	±0.00	±0.00	±1.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.92	±0.00	±0.00	±0.00	±0.92	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.89	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.89	±0.00	±0.00
α_systTplusXsec	±0.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.61	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.37	±0.00	±0.00
α_WZGenerator	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.30	±0.00	±0.00	±0.00	±0.00	±0.00	±0.30	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.10	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.05	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 12: Breakdown of the dominant systematic uncertainties on background estimates in CR_6^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_1^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	7448.16	2.20	282.63	4.11	14.81	2.96	4.69	25.42	4.29	70.17	5659.02	1377.87
Total background error	±724.55	±2.20	±61.50	±0.40	±28.90	±3.65	±5.14	±5.73	±1.60	±42.27	±694.10	±131.95
α_syst$t\bar{t}$Xsec	±565.90	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±565.90	±0.00
Jet energy scale	±385.76	±0.08	±18.05	±0.03	±0.87	±0.09	±0.22	±0.77	±0.26	±1.86	±363.53	±0.00
α_$t\bar{t}$ISRFSR	±126.66	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±126.66	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±126.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±126.07
CellOut energy scale	±83.43	±0.03	±3.63	±0.10	±0.08	±0.02	±0.09	±0.13	±0.05	±2.56	±76.74	±0.00
α_systWtXsec	±56.53	±0.00	±56.53	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$GenPlusPS	±54.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±54.39	±0.00
Lumi	±50.10	±0.06	±7.91	±0.12	±0.41	±0.08	±0.13	±0.71	±0.12	±1.96	±0.00	±38.58
α_JVF	±49.87	±0.01	±5.21	±0.03	±0.15	±0.06	±0.08	±0.06	±0.00	±0.48	±43.79	±0.00
α_PileUp	±46.63	±0.00	±5.56	±0.00	±0.25	±0.01	±0.03	±0.32	±0.43	±0.49	±41.44	±0.00
α_ZGenerator	±40.48	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±40.48	±0.00	±0.00
α_WWGenerator	±28.86	±0.00	±0.00	±0.00	±28.86	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±26.80	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±26.80	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±11.06	±0.00	±11.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±10.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±10.52	±0.00	±0.00
Jet energy resolution	±9.16	±0.01	±2.18	±0.12	±0.61	±0.18	±0.27	±0.42	±0.08	±4.22	±7.73	±0.00
CellOut energy resolution	±8.38	±0.03	±0.80	±0.04	±0.01	±0.04	±0.08	±0.13	±0.10	±0.40	±8.80	±0.00
α_systTplusXsec	±5.59	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.59	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±5.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.41
α_WZGenerator	±5.09	±0.00	±0.00	±0.00	±0.00	±0.00	±5.09	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±3.64	±0.00	±0.00	±0.00	±0.00	±3.64	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±2.31	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.31	±0.00	±0.00
α_systtZXsec	±2.19	±2.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±1.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.50	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.79	±0.00	±0.00	±0.00	±0.79	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.74	±0.00	±0.00	±0.00	±0.74	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.57	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.57	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.45	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.35	±0.00	±0.00	±0.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.21	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.15	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.11	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 13: Breakdown of the dominant systematic uncertainties on background estimates in CR_1^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_1^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	5746.26	2.20	282.63	4.11	14.80	2.96	4.69	25.42	4.28	70.17	3957.13	1377.87
Total background error	±76.35	±2.19	±61.02	±0.40	±28.84	±3.63	±5.11	±5.70	±1.59	±42.00	±176.30	±131.13
mu_$t\bar{t}$SF	±530.40	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±530.40	±0.00
α_syst$t\bar{t}$Xsec	±391.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±391.01	±0.00
Jet energy scale	±273.98	±0.08	±17.89	±0.03	±0.86	±0.09	±0.21	±0.76	±0.26	±1.84	±251.94	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±125.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±125.28
α_$t\bar{t}$ISRFSR	±89.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±89.09	±0.00
CellOut energy scale	±60.01	±0.03	±3.61	±0.10	±0.08	±0.02	±0.09	±0.13	±0.05	±2.55	±53.36	±0.00
α_systWtXsec	±56.07	±0.00	±56.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±49.86	±0.06	±7.88	±0.11	±0.41	±0.08	±0.13	±0.71	±0.12	±1.96	±0.00	±38.40
α_ZGenerator	±40.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±40.21	±0.00	±0.00
α_$t\bar{t}$GenPlusPS	±37.78	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±37.78	±0.00
α_JVF	±36.42	±0.01	±5.17	±0.03	±0.15	±0.06	±0.08	±0.06	±0.00	±0.48	±30.38	±0.00
α_PileUp	±33.95	±0.00	±5.53	±0.00	±0.25	±0.01	±0.03	±0.32	±0.42	±0.49	±28.78	±0.00
α_WWGenerator	±28.79	±0.00	±0.00	±0.00	±28.79	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±18.63	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±18.63	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±11.00	±0.00	±11.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±10.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±10.45	±0.00	±0.00
Jet energy resolution	±6.79	±0.01	±2.16	±0.12	±0.61	±0.17	±0.27	±0.41	±0.08	±4.20	±5.37	±0.00
CellOut energy resolution	±5.70	±0.03	±0.79	±0.04	±0.01	±0.04	±0.08	±0.13	±0.10	±0.40	±6.11	±0.00
α_systTplusXsec	±5.56	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.56	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±5.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.37
α_WZGenerator	±5.06	±0.00	±0.00	±0.00	±0.00	±0.00	±5.06	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±3.62	±0.00	±0.00	±0.00	±0.00	±3.62	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±2.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.29	±0.00	±0.00
α_systtZXsec	±2.18	±2.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±1.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.50	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.78	±0.00	±0.00	±0.00	±0.78	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.74	±0.00	±0.00	±0.00	±0.74	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.45	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.35	±0.00	±0.00	±0.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.21	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.15	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.10	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 14: Breakdown of the dominant systematic uncertainties on background estimates in CR_1^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_2^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	7456.86	2.20	280.85	4.10	14.74	2.96	4.68	25.42	4.27	68.86	5661.14	1387.64
Total background error	±723.67	±2.19	±60.83	±0.41	±28.91	±3.67	±5.17	±5.73	±1.56	±40.98	±693.95	±132.40
α_syst$t\bar{t}$Xsec	±566.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±566.11	±0.00
Jet energy scale	±382.59	±0.08	±16.82	±0.03	±0.90	±0.09	±0.22	±0.73	±0.26	±1.92	±361.54	±0.00
α_$t\bar{t}$ISRFSR	±127.89	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±127.89	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±126.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±126.46
CellOut energy scale	±83.68	±0.03	±3.75	±0.10	±0.08	±0.02	±0.09	±0.15	±0.05	±2.73	±76.68	±0.00
α_$t\bar{t}$GenPlusPS	±60.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±60.00	±0.00
α_systWtXsec	±56.17	±0.00	±56.17	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±50.28	±0.06	±7.86	±0.11	±0.41	±0.08	±0.13	±0.71	±0.12	±1.93	±0.00	±38.85
α_JVF	±49.70	±0.01	±5.03	±0.03	±0.15	±0.06	±0.08	±0.06	±0.00	±0.45	±43.83	±0.00
α_PileUp	±46.04	±0.00	±5.14	±0.01	±0.26	±0.01	±0.03	±0.30	±0.28	±0.52	±41.14	±0.00
α_ZGenerator	±39.17	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±39.17	±0.00	±0.00
α_WWGenerator	±28.86	±0.00	±0.00	±0.00	±28.86	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±26.80	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±26.80	±0.00
Jet energy resolution	±11.41	±0.01	±3.26	±0.13	±0.58	±0.18	±0.27	±0.40	±0.08	±4.17	±11.10	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±11.03	±0.00	±11.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±10.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±10.33	±0.00	±0.00
CellOut energy resolution	±7.90	±0.04	±1.65	±0.04	±0.01	±0.04	±0.08	±0.14	±0.10	±0.52	±9.04	±0.00
α_systTplusXsec	±5.59	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.59	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±5.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.41
α_WZGenerator	±5.11	±0.00	±0.00	±0.00	±0.00	±0.00	±5.11	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±3.65	±0.00	±0.00	±0.00	±0.00	±3.65	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±2.26	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.26	±0.00	±0.00
α_systtZXsec	±2.19	±2.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±1.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.50	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.79	±0.00	±0.00	±0.00	±0.79	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.74	±0.00	±0.00	±0.00	±0.74	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.57	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.57	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.45	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.35	±0.00	±0.00	±0.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.21	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.15	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.10	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 15: Breakdown of the dominant systematic uncertainties on background estimates in CR_2^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_2^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	5747.37	2.20	280.84	4.10	14.71	2.96	4.68	25.42	4.26	68.86	3951.70	1387.64
Total background error	±76.28	±2.18	±60.36	±0.41	±28.82	±3.64	±5.13	±5.69	±1.56	±40.72	±176.00	±131.57
mu_$t\bar{t}$SF	±529.68	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±529.68	±0.00
α_syst$t\bar{t}$Xsec	±390.87	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±390.87	±0.00
Jet energy scale	±271.27	±0.08	±16.68	±0.03	±0.89	±0.09	±0.21	±0.73	±0.26	±1.90	±250.40	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±125.66	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±125.66
α_$t\bar{t}$ISRFSR	±90.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±90.25	±0.00
CellOut energy scale	±60.19	±0.03	±3.73	±0.10	±0.08	±0.02	±0.09	±0.15	±0.05	±2.71	±53.23	±0.00
α_systWtXsec	±55.73	±0.00	±55.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±50.04	±0.06	±7.83	±0.11	±0.41	±0.08	±0.13	±0.71	±0.12	±1.92	±0.00	±38.67
α_$t\bar{t}$GenPlusPS	±41.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±41.61	±0.00
α_ZGenerator	±38.91	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±38.91	±0.00	±0.00
α_JVF	±36.20	±0.01	±4.99	±0.03	±0.15	±0.06	±0.08	±0.06	±0.00	±0.44	±30.37	±0.00
α_PileUp	±33.40	±0.00	±5.11	±0.01	±0.26	±0.01	±0.03	±0.30	±0.27	±0.52	±28.53	±0.00
α_WWGenerator	±28.77	±0.00	±0.00	±0.00	±28.77	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±18.60	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±18.60	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±10.96	±0.00	±10.96	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±10.26	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±10.26	±0.00	±0.00
Jet energy resolution	±8.01	±0.01	±3.24	±0.13	±0.58	±0.17	±0.27	±0.39	±0.08	±4.14	±7.70	±0.00
α_systTplusXsec	±5.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.55	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±5.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.37
CellOut energy resolution	±5.13	±0.04	±1.64	±0.04	±0.01	±0.04	±0.08	±0.14	±0.10	±0.51	±6.27	±0.00
α_WZGenerator	±5.08	±0.00	±0.00	±0.00	±0.00	±0.00	±5.08	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±3.63	±0.00	±0.00	±0.00	±0.00	±3.63	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±2.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.25	±0.00	±0.00
α_systtZXsec	±2.18	±2.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±1.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.50	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.78	±0.00	±0.00	±0.00	±0.78	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.73	±0.00	±0.00	±0.00	±0.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.45	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.35	±0.00	±0.00	±0.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.21	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.15	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.10	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 16: Breakdown of the dominant systematic uncertainties on background estimates in CR_2^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_3^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	7446.55	2.20	281.74	4.10	14.76	2.96	4.69	25.36	4.29	69.08	5659.54	1377.83
Total background error	±723.55	±2.20	±61.15	±0.41	±28.87	±3.65	±5.03	±5.72	±1.60	±41.23	±693.59	±131.95
α_syst$t\bar{t}$Xsec	±565.95	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±565.95	±0.00
Jet energy scale	±382.98	±0.08	±17.29	±0.03	±0.87	±0.09	±0.22	±0.74	±0.26	±2.04	±361.35	±0.00
α_$t\bar{t}$ISRFSR	±127.59	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±127.59	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±126.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±126.07
CellOut energy scale	±83.29	±0.03	±3.68	±0.10	±0.08	±0.02	±0.09	±0.13	±0.05	±2.68	±76.42	±0.00
α_$t\bar{t}$GenPlusPS	±59.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±59.58	±0.00
α_systWtXsec	±56.35	±0.00	±56.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±50.04	±0.06	±7.89	±0.11	±0.41	±0.08	±0.13	±0.71	±0.12	±1.93	±0.00	±38.58
α_JVF	±49.83	±0.01	±5.21	±0.03	±0.15	±0.06	±0.08	±0.06	±0.00	±0.45	±43.78	±0.00
α_PileUp	±46.71	±0.00	±5.12	±0.01	±0.25	±0.01	±0.03	±0.33	±0.43	±0.67	±42.13	±0.00
α_ZGenerator	±39.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±39.39	±0.00	±0.00
α_WWGenerator	±28.83	±0.00	±0.00	±0.00	±28.83	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±26.79	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±26.79	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±11.03	±0.00	±11.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±10.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±10.36	±0.00	±0.00
CellOut energy resolution	±7.62	±0.03	±0.80	±0.04	±0.01	±0.04	±0.08	±0.14	±0.10	±0.65	±7.77	±0.00
Jet energy resolution	±7.16	±0.02	±3.65	±0.13	±0.60	±0.18	±0.27	±0.45	±0.08	±4.43	±6.94	±0.00
α_systTplusXsec	±5.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.58	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±5.40	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.40
α_WZGenerator	±4.97	±0.00	±0.00	±0.00	±0.00	±0.00	±4.97	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±3.63	±0.00	±0.00	±0.00	±0.00	±3.63	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±2.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.27	±0.00	±0.00
α_systtZXsec	±2.19	±2.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±1.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.50	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.79	±0.00	±0.00	±0.00	±0.79	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.74	±0.00	±0.00	±0.00	±0.74	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.57	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.57	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.45	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.35	±0.00	±0.00	±0.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.21	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.15	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.11	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 17: Breakdown of the dominant systematic uncertainties on background estimates in CR_3^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_3^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	5744.80	2.20	281.74	4.10	14.72	2.96	4.69	25.36	4.28	69.08	3957.84	1377.82
Total background error	±76.24	±2.19	±60.70	±0.41	±28.72	±3.63	±4.99	±5.68	±1.59	±40.96	±175.79	±131.12
mu_$t\bar{t}$SF	±532.75	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±532.75	±0.00
α_syst$t\bar{t}$Xsec	±393.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±393.05	±0.00
Jet energy scale	±272.51	±0.08	±17.17	±0.03	±0.86	±0.09	±0.21	±0.74	±0.26	±2.02	±251.03	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±125.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±125.28
α_$t\bar{t}$ISRFSR	±90.31	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±90.31	±0.00
CellOut energy scale	±59.95	±0.03	±3.66	±0.10	±0.08	±0.02	±0.09	±0.13	±0.05	±2.66	±53.13	±0.00
α_systWtXsec	±55.93	±0.00	±55.93	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±49.80	±0.06	±7.85	±0.11	±0.41	±0.08	±0.13	±0.71	±0.12	±1.93	±0.00	±38.40
α_$t\bar{t}$GenPlusPS	±41.40	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±41.40	±0.00
α_ZGenerator	±39.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±39.13	±0.00	±0.00
α_JVF	±36.44	±0.01	±5.17	±0.03	±0.15	±0.06	±0.08	±0.06	±0.00	±0.44	±30.43	±0.00
α_PileUp	±33.83	±0.00	±5.08	±0.01	±0.25	±0.01	±0.03	±0.32	±0.42	±0.66	±29.27	±0.00
α_WWGenerator	±28.68	±0.00	±0.00	±0.00	±28.68	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±18.63	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±18.63	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±10.97	±0.00	±10.97	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±10.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±10.29	±0.00	±0.00
α_systTplusXsec	±5.54	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.54	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±5.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.37
CellOut energy resolution	±5.25	±0.03	±0.79	±0.04	±0.01	±0.04	±0.08	±0.14	±0.10	±0.64	±5.40	±0.00
Jet energy resolution	±5.04	±0.02	±3.62	±0.13	±0.60	±0.17	±0.27	±0.44	±0.08	±4.40	±4.82	±0.00
α_WZGenerator	±4.94	±0.00	±0.00	±0.00	±0.00	±0.00	±4.94	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±3.61	±0.00	±0.00	±0.00	±0.00	±3.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±2.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.25	±0.00	±0.00
α_systtZXsec	±2.18	±2.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±1.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.50	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.78	±0.00	±0.00	±0.00	±0.78	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.73	±0.00	±0.00	±0.00	±0.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.45	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.35	±0.00	±0.00	±0.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.21	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.15	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.10	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 18: Breakdown of the dominant systematic uncertainties on background estimates in CR_3^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_4^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	3706.41	0.36	242.97	4.08	152.18	3.23	16.74	9.27	49.42	289.37	2938.79	0.00
Total background error	±414.05	±0.36	±52.45	±0.68	±61.55	±1.55	±3.09	±2.14	±17.69	±125.66	±362.75	±0.00
α_syst$t\bar{t}$Xsec	±293.88	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±293.88	±0.00
α_$t\bar{t}$Generator	±130.63	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±130.63	±0.00
α_$t\bar{t}$PartonShower	±117.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±117.55	±0.00
CellOut energy scale	±113.49	±0.01	±4.02	±0.39	±3.29	±0.07	±0.59	±0.03	±5.95	±52.23	±46.96	±0.00
α_trigger	±111.19	±0.01	±7.29	±0.12	±4.57	±0.10	±0.50	±0.28	±1.48	±8.68	±88.16	±0.00
α_ZGenerator	±79.30	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±79.30	±0.00	±0.00
α_JVF	±64.18	±0.00	±7.68	±0.04	±7.30	±0.20	±0.34	±0.01	±1.13	±22.98	±24.51	±0.00
α_PileUp	±60.58	±0.00	±0.16	±0.15	±0.71	±0.06	±0.52	±0.05	±8.60	±49.06	±3.11	±0.00
α_WWGenerator	±58.20	±0.00	±0.00	±0.00	±58.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±52.85	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±52.85	±0.00
α_systWtXsec	±48.59	±0.00	±48.59	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±43.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±43.41	±0.00	±0.00
CellOut energy resolution	±39.37	±0.01	±7.45	±0.26	±0.40	±0.04	±0.21	±0.03	±5.59	±27.46	±0.99	±0.00
Jet energy scale	±35.40	±0.04	±4.47	±0.18	±6.37	±0.10	±0.04	±0.10	±6.96	±16.17	±23.40	±0.00
Lumi	±21.49	±0.01	±6.80	±0.11	±4.26	±0.09	±0.47	±0.26	±1.38	±8.10	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±19.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±19.36	±0.00
Jet energy resolution	±18.41	±0.00	±5.55	±0.10	±13.85	±0.30	±1.13	±0.43	±9.68	±23.35	±5.86	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±15.93	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±15.93	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±10.43	±0.00	±10.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±7.61	±0.00	±0.00	±0.00	±7.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±4.96	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.96	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±2.55	±0.00	±0.00	±0.00	±2.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±2.19	±0.00	±0.00	±0.00	±0.00	±0.00	±2.19	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±2.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.04	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±1.47	±0.00	±0.00	±0.00	±0.00	±1.47	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±1.17	±0.00	±0.00	±0.00	±0.00	±0.00	±1.17	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.94	±0.00	±0.00	±0.00	±0.00	±0.00	±0.94	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.39	±0.00	±0.00	±0.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.36	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.29	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.28	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.21	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.16	±0.00	±0.00	±0.00	±0.00	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 19: Breakdown of the dominant systematic uncertainties on background estimates in CR_4^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_4^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	4034.85	0.36	243.24	4.09	152.57	3.23	16.75	9.27	49.51	288.88	3266.96	0.00
Total background error	±64.70	±0.36	±52.13	±0.68	±61.16	±1.54	±3.07	±2.13	±17.59	±124.78	±176.21	±0.00
mu_$t\bar{t}$SF	±456.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±456.46	±0.00
α_syst$t\bar{t}$Xsec	±323.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±323.58	±0.00
α_$t\bar{t}$Generator	±144.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±144.37	±0.00
α_$t\bar{t}$PartonShower	±129.77	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±129.77	±0.00
α_trigger	±120.18	±0.01	±7.24	±0.12	±4.54	±0.10	±0.50	±0.28	±1.47	±8.60	±97.31	±0.00
CellOut energy scale	±118.07	±0.01	±3.99	±0.38	±3.27	±0.07	±0.59	±0.03	±5.92	±51.89	±51.97	±0.00
α_ZGenerator	±78.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±78.73	±0.00	±0.00
α_JVF	±66.46	±0.00	±7.64	±0.04	±7.25	±0.20	±0.34	±0.01	±1.12	±22.82	±27.06	±0.00
α_PileUp	±60.50	±0.00	±0.16	±0.15	±0.71	±0.06	±0.52	±0.05	±8.55	±48.71	±3.43	±0.00
α_WWGenerator	±57.84	±0.00	±0.00	±0.00	±57.84	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±55.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±55.69	±0.00
α_systWtXsec	±48.29	±0.00	±48.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±43.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±43.05	±0.00	±0.00
CellOut energy resolution	±39.00	±0.01	±7.41	±0.26	±0.40	±0.04	±0.20	±0.03	±5.56	±27.27	±1.09	±0.00
Jet energy scale	±37.76	±0.04	±4.44	±0.17	±6.32	±0.09	±0.04	±0.10	±6.92	±16.05	±25.85	±0.00
Lumi	±21.40	±0.01	±6.78	±0.11	±4.25	±0.09	±0.47	±0.26	±1.38	±8.05	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±21.40	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±21.40	±0.00
Jet energy resolution	±18.92	±0.00	±5.52	±0.10	±13.76	±0.29	±1.12	±0.43	±9.62	±23.18	±6.48	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±15.82	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±15.82	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±10.39	±0.00	±10.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±7.58	±0.00	±0.00	±0.00	±7.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±4.95	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.95	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±2.54	±0.00	±0.00	±0.00	±2.54	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±2.17	±0.00	±0.00	±0.00	±0.00	±0.00	±2.17	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±2.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.03	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±1.46	±0.00	±0.00	±0.00	±0.00	±1.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±1.16	±0.00	±0.00	±0.00	±0.00	±0.00	±1.16	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.93	±0.00	±0.00	±0.00	±0.00	±0.00	±0.93	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.39	±0.00	±0.00	±0.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.36	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.27	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.21	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.16	±0.00	±0.00	±0.00	±0.00	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 20: Breakdown of the dominant systematic uncertainties on background estimates in CR_4^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_5^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	14687.67	1.77	580.16	24.26	303.91	4.68	39.26	36.84	292.89	1274.94	12128.96	0.00
Total background error	±1665.52	±1.76	±124.26	±2.15	±86.15	±3.84	±4.83	±8.33	±71.13	±355.40	±1531.30	±0.00
α_syst$t\bar{t}$Xsec	±1212.90	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1212.90	±0.00
Jet energy scale	±661.50	±0.07	±30.76	±1.54	±18.95	±0.30	±2.09	±0.93	±12.25	±75.89	±518.72	±0.00
α_$t\bar{t}$PartonShower	±485.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±485.16	±0.00
α_$t\bar{t}$Generator	±459.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±459.16	±0.00
α_trigger	±440.63	±0.05	±17.40	±0.73	±9.12	±0.14	±1.18	±1.11	±8.79	±38.25	±363.87	±0.00
CellOut energy scale	±238.55	±0.05	±7.10	±0.48	±2.02	±0.18	±0.06	±0.04	±42.55	±114.31	±71.74	±0.00
α_ZGenerator	±198.81	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±198.81	±0.00	±0.00
α_syst$Z$Xsec	±191.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±191.24	±0.00	±0.00
Jet energy resolution	±178.57	±0.03	±2.82	±0.35	±8.33	±0.14	±1.07	±0.47	±36.42	±114.03	±34.00	±0.00
α_JVF	±156.33	±0.00	±10.28	±0.14	±8.36	±0.21	±0.65	±0.07	±3.13	±36.64	±96.84	±0.00
α_systWtXsec	±116.03	±0.00	±116.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±80.64	±0.00	±0.00	±0.00	±80.64	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±71.64	±0.05	±16.24	±0.68	±8.51	±0.13	±1.10	±1.03	±8.20	±35.70	±0.00	±0.00
CellOut energy resolution	±67.32	±0.01	±6.54	±0.23	±0.00	±0.09	±0.27	±0.15	±12.79	±28.91	±18.81	±0.00
α_PileUp	±54.41	±0.01	±0.41	±0.08	±4.19	±0.01	±0.01	±0.01	±36.07	±113.70	±91.48	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±39.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±39.36	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±23.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±23.27	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±16.05	±0.00	±16.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±15.20	±0.00	±0.00	±0.00	±15.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±12.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±12.38	±0.00	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±11.49	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±11.49	±0.00
α_systTplusXsec	±8.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±8.11	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±3.79	±0.00	±0.00	±0.00	±0.00	±3.79	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±3.64	±0.00	±0.00	±0.00	±3.64	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±2.75	±0.00	±0.00	±0.00	±0.00	±0.00	±2.75	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±2.26	±0.00	±0.00	±0.00	±0.00	±0.00	±2.26	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±1.76	±1.76	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±1.42	±0.00	±0.00	±0.00	±0.00	±0.00	±1.42	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±1.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.21	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.92	±0.00	±0.00	±0.92	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.55	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.25	±0.00	±0.00	±0.00	±0.00	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.23	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.09	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 21: Breakdown of the dominant systematic uncertainties on background estimates in CR_5^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	CR_5^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	14935.96	1.77	580.31	24.27	304.03	4.68	39.27	36.85	292.99	1275.39	12376.40	0.00
Total background error	±129.93	±1.76	±123.44	±2.14	±85.59	±3.81	±4.80	±8.28	±70.71	±352.95	±474.61	±0.00
mu_$t\bar{t}$SF	±1713.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1713.69	±0.00
α_syst$t\bar{t}$Xsec	±1227.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1227.58	±0.00
Jet energy scale	±668.20	±0.07	±30.59	±1.53	±18.84	±0.29	±2.08	±0.92	±12.20	±75.50	±526.17	±0.00
α_$t\bar{t}$PartonShower	±491.65	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±491.65	±0.00
α_$t\bar{t}$Generator	±465.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±465.33	±0.00
α_trigger	±444.97	±0.05	±17.29	±0.72	±9.06	±0.14	±1.17	±1.10	±8.73	±38.00	±368.71	±0.00
CellOut energy scale	±238.91	±0.05	±7.07	±0.48	±2.01	±0.18	±0.06	±0.04	±42.35	±113.79	±72.85	±0.00
α_ZGenerator	±197.51	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±197.51	±0.00	±0.00
α_syst$Z$Xsec	±189.95	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±189.95	±0.00	±0.00
Jet energy resolution	±178.06	±0.03	±2.80	±0.34	±8.27	±0.14	±1.07	±0.46	±36.18	±113.27	±34.45	±0.00
α_JVF	±157.38	±0.00	±10.23	±0.14	±8.32	±0.21	±0.65	±0.07	±3.12	±36.43	±98.23	±0.00
α_systWtXsec	±115.26	±0.00	±115.26	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±80.11	±0.00	±0.00	±0.00	±80.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±71.33	±0.05	±16.17	±0.68	±8.47	±0.13	±1.09	±1.03	±8.17	±35.54	±0.00	±0.00
CellOut energy resolution	±67.25	±0.01	±6.50	±0.23	±0.00	±0.09	±0.27	±0.15	±12.70	±28.72	±19.06	±0.00
α_PileUp	±52.24	±0.01	±0.40	±0.08	±4.16	±0.01	±0.01	±0.01	±35.83	±112.96	±92.70	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±39.94	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±39.94	±0.00
α_$t\bar{t}$ISRFSR	±26.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±26.16	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±23.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±23.15	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±15.97	±0.00	±15.97	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±15.10	±0.00	±0.00	±0.00	±15.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±12.31	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±12.31	±0.00	±0.00	±0.00
α_systTplusXsec	±8.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±8.05	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±3.77	±0.00	±0.00	±0.00	±0.00	±3.77	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±3.62	±0.00	±0.00	±0.00	±3.62	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±2.73	±0.00	±0.00	±0.00	±0.00	±0.00	±2.73	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±2.24	±0.00	±0.00	±0.00	±0.00	±0.00	±2.24	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±1.75	±1.75	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±1.42	±0.00	±0.00	±0.00	±0.00	±0.00	±1.42	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.91	±0.00	±0.00	±0.91	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.55	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.24	±0.00	±0.00	±0.00	±0.00	±0.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.23	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.09	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 22: Breakdown of the dominant systematic uncertainties on background estimates in CR_5^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_1^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	113.37	0.01	6.02	0.02	0.14	0.00	0.12	0.81	0.00	4.64	65.53	36.08
Total background error	±25.51	±0.01	±2.50	±0.02	±0.26	±0.00	±0.11	±0.24	±0.00	±4.80	±14.74	±19.83
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±19.81	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±19.81
Jet energy scale	±11.48	±0.00	±0.03	±0.01	±0.06	±0.00	±0.01	±0.09	±0.00	±0.41	±10.92	±0.00
α_syst$t\bar{t}$Xsec	±6.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.55	±0.00
α_$t\bar{t}$GenPlusPS	±5.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.18	±0.00
α_ZGenerator	±4.64	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.64	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±3.78	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.78	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±2.86	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.86	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.76	±0.00	±1.76	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy scale	±1.61	±0.00	±0.08	±0.00	±0.00	±0.00	±0.01	±0.04	±0.00	±0.02	±1.47	±0.00
Lumi	±1.34	±0.00	±0.17	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.13	±0.00	±1.01
α_PileUp	±1.23	±0.00	±0.30	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.41	±0.52	±0.00
α_systWtXsec	±1.20	±0.00	±1.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.92	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.28	±0.56	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.75	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.75	±0.00	±0.00
α_syst$Z$Xsec	±0.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.70	±0.00	±0.00
α_JVF	±0.68	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.51	±0.00
α_WWGenerator	±0.24	±0.00	±0.00	±0.00	±0.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±0.17	±0.00	±1.25	±0.00	±0.04	±0.00	±0.07	±0.10	±0.00	±0.22	±1.66	±0.00
α_$Fakes$Syst	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.06	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 23: Breakdown of the dominant systematic uncertainties on background estimates in VR_1^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_1^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	94.63	0.01	6.02	0.02	0.14	0.00	0.12	0.81	0.00	4.63	46.79	36.08
Total background error	±21.41	±0.01	±2.49	±0.02	±0.26	±0.00	±0.11	±0.24	±0.00	±4.77	±6.22	±19.83
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±19.81	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±19.81
Jet energy scale	±8.28	±0.00	±0.03	±0.01	±0.06	±0.00	±0.01	±0.09	±0.00	±0.41	±7.73	±0.00
mu_$t\bar{t}$DF	±6.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.36	±0.00
α_syst$t\bar{t}$Xsec	±4.62	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.62	±0.00
α_ZGenerator	±4.60	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.60	±0.00	±0.00
α_$t\bar{t}$GenPlusPS	±3.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.67	±0.00
α_$t\bar{t}$ISRFSR	±2.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.45	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±2.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.04	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.76	±0.00	±1.76	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±1.33	±0.00	±0.17	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.13	±0.00	±1.01
α_systWtXsec	±1.19	±0.00	±1.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy scale	±1.18	±0.00	±0.08	±0.00	±0.00	±0.00	±0.01	±0.04	±0.00	±0.02	±1.04	±0.00
α_PileUp	±1.07	±0.00	±0.29	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.41	±0.37	±0.00
CellOut energy resolution	±0.76	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.27	±0.40	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.75	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.75	±0.00	±0.00
α_syst$Z$Xsec	±0.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.69	±0.00	±0.00
α_JVF	±0.53	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.36	±0.00
Jet energy resolution	±0.30	±0.00	±1.25	±0.00	±0.04	±0.00	±0.07	±0.10	±0.00	±0.22	±1.18	±0.00
α_WWGenerator	±0.24	±0.00	±0.00	±0.00	±0.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.06	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 24: Breakdown of the dominant systematic uncertainties on background estimates in VR_1^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_2^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	109.72	0.01	5.41	0.03	0.19	0.00	0.13	0.82	0.00	4.55	71.76	26.82
Total background error	±23.69	±0.01	±2.19	±0.03	±0.37	±0.00	±0.08	±0.24	±0.00	±4.78	±15.06	±17.17
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±17.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±17.15
Jet energy scale	±11.49	±0.00	±0.50	±0.00	±0.04	±0.00	±0.00	±0.06	±0.00	±0.87	±11.02	±0.00
α_syst$t\bar{t}$Xsec	±7.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±7.18	±0.00
α_$t\bar{t}$GenPlusPS	±5.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.58	±0.00
α_ZGenerator	±4.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.55	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±3.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.07	±0.00
Jet energy resolution	±2.01	±0.00	±0.59	±0.01	±0.02	±0.00	±0.01	±0.11	±0.00	±0.47	±2.01	±0.00
CellOut energy scale	±1.97	±0.00	±0.35	±0.00	±0.02	±0.00	±0.00	±0.03	±0.00	±0.14	±2.13	±0.00
α_PileUp	±1.89	±0.00	±0.60	±0.00	±0.02	±0.00	±0.00	±0.02	±0.00	±0.30	±0.96	±0.00
CellOut energy resolution	±1.62	±0.00	±0.14	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.36	±1.39	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.59	±0.00	±1.59	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±1.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.24	±0.00
α_systWtXsec	±1.08	±0.00	±1.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±1.06	±0.00	±0.15	±0.00	±0.01	±0.00	±0.00	±0.02	±0.00	±0.13	±0.00	±0.75
α_JVF	±0.77	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.74	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.73	±0.00	±0.00
α_syst$Z$Xsec	±0.68	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.68	±0.00	±0.00
α_WWGenerator	±0.36	±0.00	±0.00	±0.00	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 25: Breakdown of the dominant systematic uncertainties on background estimates in VR_2^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_2^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	89.34	0.01	5.41	0.03	0.19	0.00	0.13	0.82	0.00	4.54	51.39	26.82
Total background error	±19.00	±0.01	±2.19	±0.03	±0.37	±0.00	±0.08	±0.24	±0.00	±4.75	±6.42	±17.17
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±17.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±17.15
Jet energy scale	±8.26	±0.00	±0.49	±0.00	±0.04	±0.00	±0.00	±0.06	±0.00	±0.86	±7.80	±0.00
mu_$t\bar{t}$DF	±6.96	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.96	±0.00
α_syst$t\bar{t}$Xsec	±5.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.06	±0.00
α_ZGenerator	±4.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.52	±0.00	±0.00
α_$t\bar{t}$GenPlusPS	±3.97	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.97	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±2.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.20	±0.00
α_PileUp	±1.60	±0.00	±0.60	±0.00	±0.02	±0.00	±0.00	±0.02	±0.00	±0.30	±0.69	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.59	±0.00	±1.59	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±1.43	±0.00	±0.59	±0.01	±0.02	±0.00	±0.01	±0.11	±0.00	±0.46	±1.43	±0.00
CellOut energy scale	±1.36	±0.00	±0.35	±0.00	±0.02	±0.00	±0.00	±0.03	±0.00	±0.14	±1.52	±0.00
CellOut energy resolution	±1.22	±0.00	±0.14	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.36	±0.99	±0.00
α_systWtXsec	±1.07	±0.00	±1.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±1.06	±0.00	±0.15	±0.00	±0.01	±0.00	±0.00	±0.02	±0.00	±0.13	±0.00	±0.75
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.73	±0.00	±0.00
α_syst$Z$Xsec	±0.68	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.68	±0.00	±0.00
α_JVF	±0.56	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.53	±0.00
α_$t\bar{t}$ISRFSR	±0.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.55	±0.00
α_WWGenerator	±0.36	±0.00	±0.00	±0.00	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 26: Breakdown of the dominant systematic uncertainties on background estimates in VR_2^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_3^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	48.32	0.00	4.07	0.03	0.14	0.00	0.01	0.42	0.00	2.24	32.72	8.68
Total background error	±13.02	±0.00	±1.76	±0.03	±0.12	±0.00	±0.01	±0.15	±0.00	±2.38	±7.72	±9.29
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±9.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±9.29
Jet energy scale	±5.93	±0.00	±0.94	±0.01	±0.04	±0.00	±0.00	±0.05	±0.00	±0.38	±4.51	±0.00
$\alpha_t\bar{t}$ISRFSR	±4.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.05	±0.00
α_syst$t\bar{t}$Xsec	±3.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.27	±0.00
$\alpha_t\bar{t}$GenPlusPS	±2.63	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.63	±0.00
α_ZGenerator	±2.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.24	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±2.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.22	±0.00	±1.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy scale	±1.08	±0.00	±0.10	±0.00	±0.01	±0.00	±0.00	±0.04	±0.00	±0.04	±0.89	±0.00
α_systWtXsec	±0.81	±0.00	±0.81	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±0.74	±0.00	±0.19	±0.00	±0.01	±0.00	±0.00	±0.05	±0.00	±0.12	±0.60	±0.00
α_PileUp	±0.64	±0.00	±0.07	±0.00	±0.02	±0.00	±0.00	±0.02	±0.00	±0.25	±0.29	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.52	±0.00	±0.00
Lumi	±0.44	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.06	±0.00	±0.24
α_syst$Z$Xsec	±0.34	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.34	±0.00	±0.00
α_JVF	±0.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.27	±0.00
CellOut energy resolution	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.11	±0.06	±0.00
α_systTplusXsec	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.08	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00
α_FakesSyst	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 27: Breakdown of the dominant systematic uncertainties on background estimates in VR_3^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_3^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	39.00	0.00	4.08	0.03	0.14	0.00	0.01	0.42	0.00	2.25	23.39	8.68
Total background error	±10.53	±0.00	±1.76	±0.03	±0.11	±0.00	±0.01	±0.15	±0.00	±2.36	±3.46	±9.29
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±9.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±9.29
Jet energy scale	±4.59	±0.00	±0.93	±0.01	±0.04	±0.00	±0.00	±0.05	±0.00	±0.37	±3.19	±0.00
mu_$t\bar{t}$DF	±3.17	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.17	±0.00
α_$t\bar{t}$ISRFSR	±2.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.70	±0.00
α_syst$t\bar{t}$Xsec	±2.30	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.30	±0.00
α_ZGenerator	±2.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.23	±0.00	±0.00
α_$t\bar{t}$GenPlusPS	±1.87	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.87	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±1.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.43	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.22	±0.00	±1.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy scale	±0.82	±0.00	±0.10	±0.00	±0.01	±0.00	±0.00	±0.04	±0.00	±0.04	±0.63	±0.00
α_systWtXsec	±0.81	±0.00	±0.81	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±0.57	±0.00	±0.19	±0.00	±0.01	±0.00	±0.00	±0.05	±0.00	±0.11	±0.43	±0.00
α_PileUp	±0.55	±0.00	±0.07	±0.00	±0.02	±0.00	±0.00	±0.02	±0.00	±0.24	±0.21	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.52	±0.00	±0.00
Lumi	±0.44	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.06	±0.00	±0.24
α_syst$Z$Xsec	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.33	±0.00	±0.00
α_JVF	±0.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.19	±0.00
CellOut energy resolution	±0.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.11	±0.04	±0.00
α_systTplusXsec	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.08	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 28: Breakdown of the dominant systematic uncertainties on background estimates in VR_3^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_4^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	919.53	0.16	55.39	1.72	60.22	0.11	3.92	9.48	0.00	33.49	755.03	0.00
Total background error	±291.33	±0.17	±13.98	±0.28	±13.11	±0.09	±1.95	±2.24	±0.00	±19.98	±283.19	±0.00
$\alpha_t\bar{t}$ISRFSR	±246.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±246.11	±0.00
Jet energy scale	±106.52	±0.01	±5.98	±0.19	±4.95	±0.01	±0.23	±0.62	±0.00	±5.01	±89.51	±0.00
α_syst$t\bar{t}$Xsec	±75.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±75.50	±0.00
$\alpha_t\bar{t}$Generator	±53.60	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±53.60	±0.00
Jet energy resolution	±38.14	±0.01	±1.53	±0.05	±0.00	±0.00	±0.19	±0.18	±0.00	±3.21	±32.96	±0.00
$\alpha_t\bar{t}$PartonShower	±30.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±30.20	±0.00
α_trigger	±27.59	±0.00	±1.66	±0.05	±1.81	±0.00	±0.12	±0.28	±0.00	±1.00	±22.65	±0.00
CellOut energy scale	±19.20	±0.00	±0.22	±0.05	±0.39	±0.00	±0.04	±0.04	±0.00	±0.20	±18.70	±0.00
α_ZGenerator	±18.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±18.29	±0.00	±0.00
α_WWGenerator	±11.35	±0.00	±0.00	±0.00	±11.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±11.08	±0.00	±11.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±9.99	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±9.99	±0.00
α_PileUp	±6.20	±0.01	±1.99	±0.06	±0.65	±0.00	±0.07	±0.12	±0.00	±0.44	±5.41	±0.00
CellOut energy resolution	±6.09	±0.00	±0.60	±0.03	±0.34	±0.00	±0.09	±0.01	±0.00	±0.44	±5.78	±0.00
α_JVF	±5.58	±0.00	±0.36	±0.02	±0.90	±0.00	±0.03	±0.01	±0.00	±0.39	±3.87	±0.00
α_syst$Z$Xsec	±5.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.02	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±4.98	±0.00	±4.98	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±4.61	±0.00	±1.55	±0.05	±1.69	±0.00	±0.11	±0.27	±0.00	±0.94	±0.00	±0.00
α_systWWXsec	±3.01	±0.00	±0.00	±0.00	±3.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±2.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.09	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±1.85	±0.00	±0.00	±0.00	±0.00	±0.00	±1.85	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±1.38	±0.00	±0.00	±0.00	±1.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±1.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.29	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.28	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.27	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.16	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.16	±0.00	±0.00	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.08	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.04	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.02	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_FakesSyst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 29: Breakdown of the dominant systematic uncertainties on background estimates in VR_4^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_4^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	850.99	0.16	55.39	1.72	60.22	0.11	3.92	9.48	0.00	33.49	686.50	0.00
Total background error	±219.10	±0.17	±13.90	±0.28	±13.03	±0.09	±1.93	±2.23	±0.00	±19.85	±215.66	±0.00
$\alpha_t\bar{t}$ISRFSR	±212.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±212.13	±0.00
mu_$t\bar{t}$DF	±114.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±114.58	±0.00
Jet energy scale	±97.98	±0.01	±5.95	±0.19	±4.93	±0.01	±0.23	±0.62	±0.00	±4.99	±81.06	±0.00
α_syst$t\bar{t}$Xsec	±68.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±68.20	±0.00
$\alpha_t\bar{t}$Generator	±48.47	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±48.47	±0.00
Jet energy resolution	±34.96	±0.01	±1.52	±0.05	±0.00	±0.00	±0.19	±0.18	±0.00	±3.19	±29.80	±0.00
$\alpha_t\bar{t}$PartonShower	±27.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±27.28	±0.00
α_trigger	±25.36	±0.00	±1.65	±0.05	±1.79	±0.00	±0.12	±0.28	±0.00	±1.00	±20.46	±0.00
α_ZGenerator	±18.17	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±18.17	±0.00	±0.00
CellOut energy scale	±17.41	±0.00	±0.22	±0.05	±0.39	±0.00	±0.04	±0.04	±0.00	±0.20	±16.91	±0.00
α_WWGenerator	±11.27	±0.00	±0.00	±0.00	±11.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±11.00	±0.00	±11.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±9.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±9.08	±0.00
α_PileUp	±5.67	±0.01	±1.98	±0.06	±0.65	±0.00	±0.07	±0.12	±0.00	±0.43	±4.89	±0.00
CellOut energy resolution	±5.53	±0.00	±0.59	±0.03	±0.34	±0.00	±0.08	±0.01	±0.00	±0.44	±5.22	±0.00
α_JVF	±5.20	±0.00	±0.36	±0.02	±0.89	±0.00	±0.03	±0.01	±0.00	±0.39	±3.50	±0.00
α_syst$Z$Xsec	±4.99	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.99	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±4.98	±0.00	±4.98	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±4.58	±0.00	±1.54	±0.05	±1.68	±0.00	±0.11	±0.26	±0.00	±0.93	±0.00	±0.00
α_systWWXsec	±2.99	±0.00	±0.00	±0.00	±2.99	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±2.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.07	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±1.84	±0.00	±0.00	±0.00	±0.00	±0.00	±1.84	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±1.38	±0.00	±0.00	±0.00	±1.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±1.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.29	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.28	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.27	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.16	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.16	±0.00	±0.00	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.08	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.04	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.02	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_FakesSyst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 30: Breakdown of the dominant systematic uncertainties on background estimates in VR_4^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_5^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	139.08	0.04	8.51	0.14	9.71	0.02	0.41	1.72	0.00	0.25	118.28	0.00
Total background error	±29.06	±0.04	±3.89	±0.06	±2.04	±0.02	±0.53	±0.41	±0.00	±0.26	±27.19	±0.00
α_$t\bar{t}$Generator	±16.94	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±16.94	±0.00
α_syst$t\bar{t}$Xsec	±11.83	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±11.83	±0.00
CellOut energy scale	±11.70	±0.00	±0.54	±0.01	±0.25	±0.00	±0.00	±0.06	±0.00	±0.01	±10.83	±0.00
Jet energy resolution	±10.20	±0.00	±1.88	±0.01	±0.26	±0.00	±0.09	±0.07	±0.00	±0.00	±8.42	±0.00
α_PileUp	±9.27	±0.00	±1.91	±0.01	±0.16	±0.01	±0.03	±0.03	±0.00	±0.00	±7.15	±0.00
α_$t\bar{t}$PartonShower	±4.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.73	±0.00
α_trigger	±4.17	±0.00	±0.26	±0.00	±0.29	±0.00	±0.01	±0.05	±0.00	±0.01	±3.55	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±3.84	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.84	±0.00
CellOut energy resolution	±3.49	±0.00	±0.58	±0.02	±0.14	±0.00	±0.01	±0.01	±0.00	±0.02	±3.03	±0.00
α_$t\bar{t}$ISRFSR	±2.92	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.92	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.99	±0.00	±1.99	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±1.76	±0.00	±0.00	±0.00	±1.76	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±1.70	±0.00	±1.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±1.68	±0.00	±0.06	±0.00	±0.40	±0.00	±0.00	±0.00	±0.00	±0.00	±1.22	±0.00
Jet energy scale	±1.30	±0.00	±0.57	±0.02	±0.15	±0.00	±0.00	±0.01	±0.00	±0.01	±2.02	±0.00
Lumi	±0.58	±0.00	±0.24	±0.00	±0.27	±0.00	±0.01	±0.05	±0.00	±0.01	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.54	±0.00	±0.00	±0.00	±0.54	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.50	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.49	±0.00	±0.00	±0.00	±0.49	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.38	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.25	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.12	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00
α_systtZXsec	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00
α_systWZXsec	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 31: Breakdown of the dominant systematic uncertainties on background estimates in VR_5^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_5^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	159.46	0.04	8.51	0.14	9.71	0.02	0.41	1.72	0.00	0.26	138.65	0.00
Total background error	±18.82	±0.04	±3.87	±0.06	±2.02	±0.02	±0.53	±0.41	±0.00	±0.26	±17.56	±0.00
mu_$t\bar{t}$DF	±24.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±24.08	±0.00
α_$t\bar{t}$Generator	±19.74	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±19.74	±0.00
α_syst$t\bar{t}$Xsec	±13.79	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±13.79	±0.00
CellOut energy scale	±13.48	±0.00	±0.54	±0.01	±0.25	±0.00	±0.00	±0.06	±0.00	±0.01	±12.62	±0.00
Jet energy resolution	±11.57	±0.00	±1.87	±0.01	±0.26	±0.00	±0.09	±0.07	±0.00	±0.00	±9.81	±0.00
α_PileUp	±10.43	±0.00	±1.90	±0.01	±0.16	±0.01	±0.03	±0.03	±0.00	±0.00	±8.33	±0.00
α_$t\bar{t}$PartonShower	±5.51	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.51	±0.00
α_trigger	±4.75	±0.00	±0.25	±0.00	±0.29	±0.00	±0.01	±0.05	±0.00	±0.01	±4.13	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±4.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.50	±0.00
CellOut energy resolution	±3.99	±0.00	±0.57	±0.02	±0.14	±0.00	±0.01	±0.01	±0.00	±0.02	±3.53	±0.00
α_$t\bar{t}$ISRFSR	±2.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.01	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.99	±0.00	±1.99	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±1.88	±0.00	±0.06	±0.00	±0.40	±0.00	±0.00	±0.00	±0.00	±0.00	±1.42	±0.00
α_WWGenerator	±1.75	±0.00	±0.00	±0.00	±1.75	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±1.69	±0.00	±1.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy scale	±1.64	±0.00	±0.57	±0.02	±0.15	±0.00	±0.00	±0.01	±0.00	±0.01	±2.35	±0.00
Lumi	±0.58	±0.00	±0.24	±0.00	±0.27	±0.00	±0.01	±0.05	±0.00	±0.01	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.54	±0.00	±0.00	±0.00	±0.54	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.50	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.48	±0.00	±0.00	±0.00	±0.48	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.38	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.25	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.12	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00
α_systtZXsec	±0.04	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00
α_systWZXsec	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 32: Breakdown of the dominant systematic uncertainties on background estimates in VR_5^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_6^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	188.44	0.06	13.47	0.33	21.10	0.03	1.05	2.63	0.00	2.57	147.21	0.00
Total background error	±48.61	±0.06	±5.81	±0.10	±5.41	±0.02	±1.08	±0.62	±0.00	±2.62	±46.02	±0.00
α_$t\bar{t}$Generator	±29.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±29.13	±0.00
α_$t\bar{t}$ISRFSR	±25.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±25.37	±0.00
α_syst$t\bar{t}$Xsec	±14.72	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±14.72	±0.00
Jet energy resolution	±14.52	±0.00	±4.16	±0.05	±0.23	±0.00	±0.06	±0.07	±0.00	±0.06	±10.35	±0.00
CellOut energy scale	±12.48	±0.00	±0.64	±0.00	±0.48	±0.00	±0.02	±0.02	±0.00	±0.01	±11.34	±0.00
α_PileUp	±9.66	±0.01	±1.56	±0.02	±0.01	±0.01	±0.16	±0.01	±0.00	±0.07	±8.01	±0.00
Jet energy scale	±7.57	±0.00	±0.34	±0.05	±1.57	±0.01	±0.14	±0.08	±0.00	±0.28	±5.79	±0.00
α_$t\bar{t}$PartonShower	±5.89	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.89	±0.00
α_trigger	±5.65	±0.00	±0.40	±0.01	±0.63	±0.00	±0.03	±0.08	±0.00	±0.08	±4.42	±0.00
α_WWGenerator	±4.87	±0.00	±0.00	±0.00	±4.87	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±4.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.37	±0.00
α_systWtXsec	±2.69	±0.00	±2.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±2.57	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.57	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±2.43	±0.00	±2.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±1.59	±0.00	±0.06	±0.00	±0.49	±0.00	±0.00	±0.00	±0.00	±0.02	±1.13	±0.00
Lumi	±1.15	±0.00	±0.38	±0.01	±0.59	±0.00	±0.03	±0.07	±0.00	±0.07	±0.00	±0.00
α_systWWXsec	±1.05	±0.00	±0.00	±0.00	±1.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±1.01	±0.00	±0.00	±0.00	±0.00	±0.00	±1.01	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.83	±0.00	±0.14	±0.01	±0.14	±0.00	±0.21	±0.00	±0.00	±0.02	±0.63	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.81	±0.00	±0.00	±0.00	±0.81	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.58	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.39	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.12	±0.00	±0.00
α_systWZXsec	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.06	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.02	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 33: Breakdown of the dominant systematic uncertainties on background estimates in VR_6^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_6^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	243.91	0.06	13.44	0.33	21.07	0.03	1.05	2.63	0.00	2.57	202.73	0.00
Total background error	±34.74	±0.06	±5.78	±0.10	±5.38	±0.02	±1.07	±0.61	±0.00	±2.59	±33.02	±0.00
mu_$t\bar{t}$DF	±55.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±55.08	±0.00
α_$t\bar{t}$ISRFSR	±40.80	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±40.80	±0.00
α_$t\bar{t}$Generator	±39.66	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±39.66	±0.00
α_syst$t\bar{t}$Xsec	±20.31	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±20.31	±0.00
Jet energy resolution	±18.20	±0.00	±4.13	±0.05	±0.23	±0.00	±0.06	±0.07	±0.00	±0.06	±14.06	±0.00
CellOut energy scale	±16.36	±0.00	±0.63	±0.00	±0.48	±0.00	±0.02	±0.02	±0.00	±0.01	±15.25	±0.00
α_PileUp	±12.52	±0.01	±1.55	±0.02	±0.01	±0.01	±0.16	±0.01	±0.00	±0.07	±10.88	±0.00
Jet energy scale	±9.74	±0.00	±0.36	±0.05	±1.59	±0.01	±0.14	±0.08	±0.00	±0.28	±7.97	±0.00
α_$t\bar{t}$PartonShower	±8.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±8.07	±0.00
α_trigger	±7.27	±0.00	±0.40	±0.01	±0.63	±0.00	±0.03	±0.08	±0.00	±0.08	±6.05	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±6.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.01	±0.00
α_WWGenerator	±4.84	±0.00	±0.00	±0.00	±4.84	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±2.67	±0.00	±2.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±2.54	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.54	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±2.43	±0.00	±2.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±2.00	±0.00	±0.06	±0.00	±0.49	±0.00	±0.00	±0.00	±0.00	±0.02	±1.54	±0.00
Lumi	±1.15	±0.00	±0.37	±0.01	±0.59	±0.00	±0.03	±0.07	±0.00	±0.07	±0.00	±0.00
CellOut energy resolution	±1.06	±0.00	±0.14	±0.01	±0.14	±0.00	±0.21	±0.00	±0.00	±0.02	±0.86	±0.00
α_systWWXsec	±1.05	±0.00	±0.00	±0.00	±1.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±1.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.81	±0.00	±0.00	±0.00	±0.81	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.58	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.58	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.38	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.12	±0.00	±0.00
α_systWZXsec	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.06	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.02	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 34: Breakdown of the dominant systematic uncertainties on background estimates in VR_6^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_1^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	101.87	0.01	4.32	0.00	0.04	0.00	0.08	0.90	0.00	1.43	68.55	26.54
Total background error	±24.49	±0.01	±1.74	±0.02	±0.23	±0.03	±0.39	±0.23	±0.00	±1.56	±17.10	±17.17
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±17.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±17.15
α_$t\bar{t}$GenPlusPS	±12.49	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±12.49	±0.00
Jet energy scale	±8.70	±0.00	±0.00	±0.01	±0.00	±0.00	±0.03	±0.07	±0.00	±0.47	±8.10	±0.00
α_syst$t\bar{t}$Xsec	±6.85	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.85	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±2.98	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.98	±0.00
α_$t\bar{t}$ISRFSR	±2.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.69	±0.00
Jet energy resolution	±1.73	±0.01	±0.55	±0.00	±0.04	±0.00	±0.06	±0.03	±0.00	±0.03	±2.29	±0.00
α_ZGenerator	±1.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.43	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.31	±0.00	±1.31	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_PileUp	±0.96	±0.00	±0.39	±0.00	±0.01	±0.00	±0.00	±0.03	±0.00	±0.08	±1.45	±0.00
Lumi	±0.93	±0.00	±0.12	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.04	±0.00	±0.74
CellOut energy scale	±0.93	±0.00	±0.27	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.11	±0.52	±0.00
α_systWtXsec	±0.86	±0.00	±0.86	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.31	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.31	±0.00	±0.00
CellOut energy resolution	±0.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.09	±0.21	±0.00
α_WWGenerator	±0.22	±0.00	±0.00	±0.00	±0.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00
α_systTplusXsec	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.16	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.33	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07
α_ZZGenerator	±0.03	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.03	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 35: Breakdown of the dominant systematic uncertainties on background estimates in VR_1^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_1^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	81.27	0.01	4.32	0.00	0.04	0.00	0.08	0.90	0.00	1.43	47.95	26.54
Total background error	±19.78	±0.01	±1.73	±0.02	±0.23	±0.03	±0.39	±0.23	±0.00	±1.55	±9.70	±17.17
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±17.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±17.15
α_$t\bar{t}$GenPlusPS	±8.68	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±8.68	±0.00
mu_$t\bar{t}$SF	±6.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.43	±0.00
Jet energy scale	±6.20	±0.00	±0.00	±0.01	±0.00	±0.00	±0.03	±0.07	±0.00	±0.47	±5.61	±0.00
α_syst$t\bar{t}$Xsec	±4.74	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.74	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±2.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.09	±0.00
α_$t\bar{t}$ISRFSR	±2.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.08	±0.00
α_ZGenerator	±1.42	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.42	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.31	±0.00	±1.31	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±1.03	±0.01	±0.55	±0.00	±0.04	±0.00	±0.06	±0.03	±0.00	±0.03	±1.59	±0.00
Lumi	±0.93	±0.00	±0.12	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.04	±0.00	±0.74
α_systWtXsec	±0.86	±0.00	±0.86	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy scale	±0.76	±0.00	±0.27	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.11	±0.36	±0.00
α_PileUp	±0.52	±0.00	±0.38	±0.00	±0.01	±0.00	±0.00	±0.03	±0.00	±0.08	±1.01	±0.00
α_WZGenerator	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.31	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.31	±0.00	±0.00
α_WWGenerator	±0.22	±0.00	±0.00	±0.00	±0.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.09	±0.14	±0.00
α_syst$Z$Xsec	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00
α_systTplusXsec	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07
α_JVF	±0.06	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00
α_ZZGenerator	±0.03	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.03	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 36: Breakdown of the dominant systematic uncertainties on background estimates in VR_1^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_2^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	94.58	0.01	5.65	0.02	0.11	0.00	0.08	0.87	0.02	2.78	68.09	16.95
Total background error	±23.12	±0.02	±2.35	±0.03	±0.24	±0.03	±0.32	±0.25	±0.09	±2.95	±16.95	±14.02
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±14.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±14.01
Jet energy scale	±12.34	±0.01	±0.96	±0.02	±0.02	±0.00	±0.03	±0.10	±0.00	±0.67	±10.57	±0.00
α_$t\bar{t}$GenPlusPS	±9.97	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±9.97	±0.00
α_syst$t\bar{t}$Xsec	±6.81	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.81	±0.00
α_$t\bar{t}$ISRFSR	±3.82	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.82	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±2.97	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.97	±0.00
α_ZGenerator	±2.78	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.78	±0.00	±0.00
α_PileUp	±1.67	±0.00	±0.19	±0.01	±0.00	±0.00	±0.00	±0.02	±0.09	±0.03	±1.61	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.61	±0.00	±1.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±1.13	±0.00	±1.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±1.09	±0.01	±0.60	±0.01	±0.04	±0.00	±0.07	±0.10	±0.00	±0.03	±1.64	±0.00
Lumi	±0.74	±0.00	±0.16	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.08	±0.00	±0.47
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.55	±0.00	±0.00
α_syst$Z$Xsec	±0.42	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.42	±0.00	±0.00
α_JVF	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.30	±0.00
α_WZGenerator	±0.30	±0.00	±0.00	±0.00	±0.00	±0.00	±0.30	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy scale	±0.29	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.05	±0.21	±0.00
α_WWGenerator	±0.22	±0.00	±0.00	±0.00	±0.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.19	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.03	±0.01	±0.56	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.22	±0.89	±0.00
α_ZZGenerator	±0.03	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 37: Breakdown of the dominant systematic uncertainties on background estimates in VR_2^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_2^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	74.06	0.01	5.65	0.02	0.11	0.00	0.08	0.87	0.02	2.78	47.57	16.95
Total background error	±17.45	±0.02	±2.34	±0.03	±0.24	±0.03	±0.31	±0.25	±0.09	±2.93	±9.24	±14.02
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±14.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±14.01
Jet energy scale	±9.07	±0.01	±0.95	±0.02	±0.02	±0.00	±0.03	±0.10	±0.00	±0.66	±7.32	±0.00
α_$t\bar{t}$GenPlusPS	±6.92	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.92	±0.00
mu_$t\bar{t}$SF	±6.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.38	±0.00
α_syst$t\bar{t}$Xsec	±4.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.70	±0.00
α_$t\bar{t}$ISRFSR	±2.98	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.98	±0.00
α_ZGenerator	±2.76	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.76	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±2.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.08	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.61	±0.00	±1.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_PileUp	±1.17	±0.00	±0.19	±0.01	±0.00	±0.00	±0.00	±0.02	±0.09	±0.03	±1.12	±0.00
α_systWtXsec	±1.12	±0.00	±1.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±0.74	±0.00	±0.16	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.08	±0.00	±0.47
Jet energy resolution	±0.59	±0.01	±0.59	±0.01	±0.04	±0.00	±0.06	±0.10	±0.00	±0.03	±1.13	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.55	±0.00	±0.00
α_syst$Z$Xsec	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.41	±0.00	±0.00
α_WZGenerator	±0.30	±0.00	±0.00	±0.00	±0.00	±0.00	±0.30	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.21	±0.00
CellOut energy resolution	±0.23	±0.01	±0.56	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.22	±0.61	±0.00
CellOut energy scale	±0.22	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.05	±0.14	±0.00
α_WWGenerator	±0.21	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.19	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.03	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 38: Breakdown of the dominant systematic uncertainties on background estimates in VR_2^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_3^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	109.44	0.01	5.12	0.02	0.17	0.00	0.08	1.03	0.00	2.56	73.92	26.55
Total background error	±25.80	±0.01	±2.19	±0.03	±0.27	±0.04	±0.53	±0.28	±0.00	±2.69	±17.99	±17.17
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±17.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±17.15
Jet energy scale	±12.83	±0.00	±0.62	±0.01	±0.03	±0.00	±0.03	±0.11	±0.00	±0.45	±11.57	±0.00
α_$t\bar{t}$GenPlusPS	±10.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±10.24	±0.00
α_syst$t\bar{t}$Xsec	±7.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±7.39	±0.00
α_$t\bar{t}$ISRFSR	±3.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.37	±0.00
Jet energy resolution	±3.16	±0.01	±0.93	±0.02	±0.01	±0.00	±0.06	±0.04	±0.00	±0.24	±2.51	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±3.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.13	±0.00
α_ZGenerator	±2.56	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.56	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.53	±0.00	±1.53	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy scale	±1.28	±0.00	±0.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.06	±0.00
CellOut energy resolution	±1.15	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.10	±1.08	±0.00
α_PileUp	±1.14	±0.00	±0.27	±0.00	±0.02	±0.00	±0.00	±0.04	±0.00	±0.11	±0.77	±0.00
α_systWtXsec	±1.02	±0.00	±1.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±0.99	±0.00	±0.14	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.07	±0.00	±0.74
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.53	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.53	±0.00	±0.00
α_WZGenerator	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.38	±0.00	±0.00
α_JVF	±0.28	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.42	±0.00
α_WWGenerator	±0.25	±0.00	±0.00	±0.00	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.04	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 39: Breakdown of the dominant systematic uncertainties on background estimates in VR_3^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_3^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	87.26	0.01	5.12	0.02	0.17	0.00	0.08	1.03	0.00	2.56	51.73	26.55
Total background error	±20.18	±0.01	±2.18	±0.03	±0.27	±0.04	±0.53	±0.27	±0.00	±2.68	±9.57	±17.17
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±17.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±17.15
Jet energy scale	±9.29	±0.00	±0.62	±0.01	±0.03	±0.00	±0.03	±0.11	±0.00	±0.45	±8.04	±0.00
α_$t\bar{t}$GenPlusPS	±7.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±7.11	±0.00
mu_$t\bar{t}$SF	±6.96	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.96	±0.00
α_syst$t\bar{t}$Xsec	±5.14	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.14	±0.00
α_$t\bar{t}$ISRFSR	±2.75	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.75	±0.00
α_ZGenerator	±2.54	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.54	±0.00	±0.00
Jet energy resolution	±2.39	±0.01	±0.93	±0.02	±0.01	±0.00	±0.06	±0.04	±0.00	±0.24	±1.74	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±2.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.19	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±1.53	±0.00	±1.53	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±1.02	±0.00	±1.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±0.99	±0.00	±0.14	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.07	±0.00	±0.74
CellOut energy scale	±0.96	±0.00	±0.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.74	±0.00
α_PileUp	±0.90	±0.00	±0.26	±0.00	±0.02	±0.00	±0.00	±0.03	±0.00	±0.11	±0.54	±0.00
CellOut energy resolution	±0.82	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.10	±0.75	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.53	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.53	±0.00	±0.00
α_WZGenerator	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00	±0.52	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.38	±0.00	±0.00
α_WWGenerator	±0.25	±0.00	±0.00	±0.00	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.22	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.15	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.29	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.04	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 40: Breakdown of the dominant systematic uncertainties on background estimates in VR_3^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_4^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	241.08	0.09	10.67	0.34	9.39	1.64	2.92	1.67	16.07	24.11	174.17	0.00
Total background error	±36.77	±0.10	±4.56	±0.09	±1.39	±0.54	±0.70	±0.40	±4.14	±13.20	±27.69	±0.00
CellOut energy scale	±19.47	±0.00	±2.55	±0.02	±0.46	±0.03	±0.04	±0.03	±1.85	±1.83	±12.66	±0.00
α_syst$t\bar{t}$Xsec	±17.42	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±17.42	±0.00
α_PileUp	±13.70	±0.00	±1.16	±0.02	±0.22	±0.06	±0.04	±0.04	±0.11	±2.16	±10.02	±0.00
α_ZGenerator	±11.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±11.44	±0.00	±0.00
Jet energy scale	±8.92	±0.01	±1.34	±0.04	±0.07	±0.04	±0.10	±0.01	±1.53	±3.93	±2.11	±0.00
α_trigger	±7.23	±0.00	±0.32	±0.01	±0.28	±0.05	±0.09	±0.05	±0.48	±0.72	±5.23	±0.00
α_$t\bar{t}$PartonShower	±6.97	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.97	±0.00
α_$t\bar{t}$Generator	±6.68	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±6.68	±0.00
Jet energy resolution	±5.84	±0.01	±0.67	±0.02	±0.33	±0.18	±0.18	±0.06	±0.05	±0.75	±6.23	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±4.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.70	±0.00
α_JVF	±4.40	±0.00	±0.26	±0.01	±0.58	±0.07	±0.04	±0.01	±0.53	±1.38	±1.53	±0.00
α_syst$Z$Xsec	±3.62	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.62	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±3.26	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.26	±0.00	±0.00	±0.00
CellOut energy resolution	±2.80	±0.01	±0.85	±0.02	±0.10	±0.03	±0.04	±0.01	±0.23	±0.20	±3.75	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±2.27	±0.00	±2.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±2.13	±0.00	±2.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±1.87	±0.00	±0.30	±0.01	±0.26	±0.05	±0.08	±0.05	±0.45	±0.67	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±1.86	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.86	±0.00	±0.00
α_WWGenerator	±0.67	±0.00	±0.00	±0.00	±0.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.64	±0.00	±0.00	±0.00	±0.64	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±0.57	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.57	±0.00
α_systWWXsec	±0.47	±0.00	±0.00	±0.00	±0.47	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.46	±0.00	±0.00	±0.00	±0.00	±0.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.44	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.37	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.16	±0.00	±0.00	±0.00	±0.00	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.12	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.09	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.08	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.06	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.02	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 41: Breakdown of the dominant systematic uncertainties on background estimates in VR_4^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_4^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	260.75	0.09	10.70	0.34	9.40	1.64	2.92	1.67	16.08	24.20	193.69	0.00
Total background error	±27.18	±0.10	±4.55	±0.08	±1.39	±0.54	±0.70	±0.40	±4.13	±13.12	±16.13	±0.00
mu_$t\bar{t}$SF	±27.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±27.06	±0.00
CellOut energy scale	±20.78	±0.00	±2.54	±0.02	±0.46	±0.03	±0.04	±0.03	±1.84	±1.82	±14.00	±0.00
α_syst$t\bar{t}$Xsec	±19.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±19.18	±0.00
α_PileUp	±14.73	±0.00	±1.16	±0.02	±0.22	±0.06	±0.04	±0.03	±0.10	±2.15	±11.08	±0.00
α_ZGenerator	±11.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±11.36	±0.00	±0.00
Jet energy scale	±9.10	±0.01	±1.34	±0.04	±0.07	±0.04	±0.10	±0.01	±1.52	±3.90	±2.33	±0.00
α_trigger	±7.77	±0.00	±0.32	±0.01	±0.28	±0.05	±0.09	±0.05	±0.48	±0.72	±5.77	±0.00
α_$t\bar{t}$PartonShower	±7.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±7.69	±0.00
α_$t\bar{t}$Generator	±7.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±7.38	±0.00
Jet energy resolution	±6.50	±0.01	±0.67	±0.02	±0.32	±0.18	±0.18	±0.06	±0.05	±0.74	±6.89	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±5.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.22	±0.00
α_JVF	±4.54	±0.00	±0.26	±0.01	±0.57	±0.07	±0.04	±0.01	±0.53	±1.37	±1.69	±0.00
α_syst$Z$Xsec	±3.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.61	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±3.26	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.26	±0.00	±0.00	±0.00
CellOut energy resolution	±3.20	±0.01	±0.85	±0.02	±0.10	±0.03	±0.04	±0.01	±0.22	±0.20	±4.15	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±2.28	±0.00	±2.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±2.12	±0.00	±2.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±1.87	±0.00	±0.30	±0.01	±0.26	±0.05	±0.08	±0.05	±0.45	±0.67	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±1.87	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.87	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±1.17	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.17	±0.00
α_WWGenerator	±0.67	±0.00	±0.00	±0.00	±0.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.64	±0.00	±0.00	±0.00	±0.64	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.47	±0.00	±0.00	±0.00	±0.47	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.46	±0.00	±0.00	±0.00	±0.00	±0.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00	±0.45	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.44	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.37	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.16	±0.00	±0.00	±0.00	±0.00	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.12	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.09	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.08	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.06	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.02	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 42: Breakdown of the dominant systematic uncertainties on background estimates in VR_4^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_5^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	2021.95	0.23	112.96	1.61	61.89	3.60	10.27	6.32	35.53	80.71	1708.83	0.00
Total background error	±244.83	±0.23	±24.35	±0.26	±24.66	±1.65	±1.36	±1.44	±9.72	±27.56	±231.42	±0.00
α_syst$t\bar{t}$Xsec	±170.88	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±170.88	±0.00
α_$t\bar{t}$Generator	±109.34	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±109.34	±0.00
CellOut energy scale	±71.58	±0.01	±0.09	±0.12	±1.50	±0.01	±0.21	±0.06	±5.91	±12.37	±51.50	±0.00
α_$t\bar{t}$PartonShower	±68.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±68.35	±0.00
α_trigger	±60.66	±0.01	±3.39	±0.05	±1.86	±0.11	±0.31	±0.19	±1.07	±2.42	±51.27	±0.00
Jet energy resolution	±49.72	±0.02	±0.06	±0.02	±2.88	±0.40	±0.51	±0.09	±3.50	±9.44	±39.36	±0.00
α_WWGenerator	±23.81	±0.00	±0.00	±0.00	±23.81	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±22.59	±0.00	±22.59	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy scale	±22.38	±0.01	±1.45	±0.09	±2.75	±0.05	±0.30	±0.07	±2.94	±3.39	±24.01	±0.00
α_PileUp	±15.88	±0.02	±1.49	±0.01	±0.36	±0.10	±0.07	±0.03	±3.78	±9.88	±0.57	±0.00
α_JVF	±14.91	±0.01	±1.63	±0.02	±2.05	±0.15	±0.12	±0.00	±0.23	±2.22	±8.49	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±14.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±14.73	±0.00
α_ZGenerator	±14.57	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±14.57	±0.00	±0.00
α_syst$Z$Xsec	±12.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±12.11	±0.00	±0.00
Lumi	±8.77	±0.01	±3.16	±0.04	±1.73	±0.10	±0.29	±0.18	±0.99	±2.26	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±6.90	±0.00	±6.90	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±5.79	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.79	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±4.51	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.51	±0.00	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±3.76	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.76	±0.00
α_systWWXsec	±3.09	±0.00	±0.00	±0.00	±3.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±1.61	±0.00	±0.00	±0.00	±1.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±1.55	±0.00	±0.00	±0.00	±0.00	±1.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±1.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.39	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.76	±0.00	±0.00	±0.00	±0.00	±0.00	±0.76	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.72	±0.00	±0.00	±0.00	±0.00	±0.00	±0.72	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.53	±0.01	±2.57	±0.06	±0.32	±0.08	±0.02	±0.07	±1.35	±0.07	±4.28	±0.00
α_WZGenerator	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.23	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.23	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.19	±0.00	±0.00	±0.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.18	±0.00	±0.00	±0.00	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.17	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.17	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.03	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 43: Breakdown of the dominant systematic uncertainties on background estimates in VR_5^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	VR_5^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	2056.37	0.23	112.97	1.61	61.91	3.61	10.28	6.32	35.53	80.72	1743.20	0.00
Total background error	±106.63	±0.23	±24.20	±0.26	±24.50	±1.64	±1.36	±1.43	±9.68	±27.39	±105.44	±0.00
mu_$t\bar{t}$SF	±241.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±241.37	±0.00
α_syst$t\bar{t}$Xsec	±172.90	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±172.90	±0.00
α_$t\bar{t}$Generator	±110.81	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±110.81	±0.00
CellOut energy scale	±72.27	±0.01	±0.09	±0.12	±1.49	±0.01	±0.21	±0.06	±5.89	±12.32	±52.29	±0.00
α_$t\bar{t}$PartonShower	±69.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±69.25	±0.00
α_trigger	±61.26	±0.01	±3.37	±0.05	±1.84	±0.11	±0.31	±0.19	±1.06	±2.40	±51.93	±0.00
Jet energy resolution	±50.17	±0.02	±0.06	±0.02	±2.86	±0.40	±0.51	±0.09	±3.47	±9.38	±39.88	±0.00
α_WWGenerator	±23.66	±0.00	±0.00	±0.00	±23.66	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy scale	±22.73	±0.01	±1.43	±0.09	±2.73	±0.05	±0.30	±0.07	±2.93	±3.37	±24.36	±0.00
α_systWtXsec	±22.44	±0.00	±22.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_PileUp	±15.79	±0.02	±1.48	±0.01	±0.36	±0.10	±0.07	±0.03	±3.76	±9.82	±0.58	±0.00
α_$t\bar{t}$ISRFSR	±15.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±15.36	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±15.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±15.03	±0.00
α_JVF	±14.99	±0.01	±1.62	±0.02	±2.04	±0.14	±0.12	±0.00	±0.23	±2.21	±8.61	±0.00
α_ZGenerator	±14.47	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±14.47	±0.00	±0.00
α_syst$Z$Xsec	±12.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±12.02	±0.00	±0.00
Lumi	±8.73	±0.01	±3.15	±0.04	±1.73	±0.10	±0.29	±0.18	±0.99	±2.25	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±6.90	±0.00	±6.90	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±5.79	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±5.79	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±4.51	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.51	±0.00	±0.00	±0.00
α_systWWXsec	±3.08	±0.00	±0.00	±0.00	±3.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±1.61	±0.00	±0.00	±0.00	±1.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±1.54	±0.00	±0.00	±0.00	±0.00	±1.54	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±1.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.38	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.76	±0.00	±0.00	±0.00	±0.00	±0.00	±0.76	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.71	±0.00	±0.00	±0.00	±0.00	±0.00	±0.71	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.62	±0.01	±2.55	±0.06	±0.31	±0.08	±0.02	±0.07	±1.35	±0.07	±4.34	±0.00
α_WZGenerator	±0.40	±0.00	±0.00	±0.00	±0.00	±0.00	±0.40	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.23	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.23	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.19	±0.00	±0.00	±0.19	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.18	±0.00	±0.00	±0.00	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.03	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 44: Breakdown of the dominant systematic uncertainties on background estimates in VR_5^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_1^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	5.37	0.00	0.37	0.01	0.00	0.00	0.00	0.13	0.00	0.29	4.56	0.00
Total background error	±2.05	±0.00	±0.49	±0.01	±0.11	±0.00	±0.00	±0.05	±0.00	±0.33	±1.86	±0.00
α_$t\bar{t}$GenPlusPS	±1.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.33	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.86	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.86	±0.00
Jet energy scale	±0.79	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.02	±0.00	±0.10	±0.69	±0.00
Jet energy resolution	±0.73	±0.00	±0.32	±0.00	±0.02	±0.00	±0.00	±0.01	±0.00	±0.03	±0.44	±0.00
α_syst$t\bar{t}$Xsec	±0.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.46	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.37	±0.00	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.29	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.25	±0.00
α_WWGenerator	±0.11	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_PileUp	±0.10	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.11	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00
CellOut energy resolution	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.10	±0.00
α_systWtXsec	±0.07	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00
Lumi	±0.02	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy scale	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.06	±0.06	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 45: Breakdown of the dominant systematic uncertainties on background estimates in SR_1^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_1^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	4.07	0.00	0.37	0.01	0.00	0.00	0.00	0.13	0.00	0.29	3.26	0.00
Total background error	±1.45	±0.00	±0.49	±0.01	±0.11	±0.00	±0.00	±0.05	±0.00	±0.33	±1.25	±0.00
$\alpha_t\bar{t}$GenPlusPS	±0.95	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.95	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.61	±0.00
Jet energy resolution	±0.60	±0.00	±0.31	±0.00	±0.02	±0.00	±0.00	±0.01	±0.00	±0.03	±0.31	±0.00
Jet energy scale	±0.58	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.02	±0.00	±0.10	±0.49	±0.00
mu_$t\bar{t}$DF	±0.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.44	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.37	±0.00	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$t\bar{t}$Xsec	±0.32	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.32	±0.00
α_ZGenerator	±0.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.29	±0.00	±0.00
$\alpha_t\bar{t}$ISRFSR	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00
α_WWGenerator	±0.11	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00
α_systWtXsec	±0.07	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_PileUp	±0.07	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.08	±0.00
CellOut energy resolution	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.07	±0.00
α_syst$Z$Xsec	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00
Lumi	±0.02	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
α_JVF	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00
CellOut energy scale	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.06	±0.04	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_FakesSyst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 46: Breakdown of the dominant systematic uncertainties on background estimates in SR_1^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_2^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	2.81	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.10	2.63	0.00
Total background error	±2.10	±0.00	±0.50	±0.01	±0.00	±0.00	±0.00	±0.03	±0.00	±0.26	±1.64	±0.00
Jet energy scale	±1.36	±0.00	±0.31	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.03	±0.99	±0.00
Jet energy resolution	±1.16	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.23	±0.82	±0.00
α_$t\bar{t}$GenPlusPS	±0.60	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.60	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.57	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.57	±0.00
α_$t\bar{t}$ISRFSR	±0.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.50	±0.00
CellOut energy resolution	±0.40	±0.00	±0.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.11	±0.00
α_syst$t\bar{t}$Xsec	±0.26	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.26	±0.00
α_PileUp	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.01	±0.13	±0.00
CellOut energy scale	±0.12	±0.00	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.11	±0.00
α_ZGenerator	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00
α_systTplusXsec	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00
Lumi	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 47: Breakdown of the dominant systematic uncertainties on background estimates in SR_2^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_2^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	2.06	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.10	1.88	0.00
Total background error	±1.53	±0.00	±0.49	±0.01	±0.00	±0.00	±0.00	±0.03	±0.00	±0.26	±1.07	±0.00
Jet energy scale	±1.06	±0.00	±0.30	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.03	±0.70	±0.00
Jet energy resolution	±0.92	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.22	±0.58	±0.00
α_$t\bar{t}$GenPlusPS	±0.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.43	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.41	±0.00
CellOut energy resolution	±0.37	±0.00	±0.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.07	±0.00
α_$t\bar{t}$ISRFSR	±0.32	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.32	±0.00
mu_$t\bar{t}$DF	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.25	±0.00
α_syst$t\bar{t}$Xsec	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.18	±0.00
CellOut energy scale	±0.15	±0.00	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.08	±0.00
α_PileUp	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.01	±0.09	±0.00
α_ZGenerator	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00
α_systTplusXsec	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00
Lumi	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 48: Breakdown of the dominant systematic uncertainties on background estimates in SR_2^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_3^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	1.65	0.00	0.02	0.00	0.00	0.00	0.00	0.04	0.00	0.08	1.51	0.00
Total background error	±1.28	±0.00	±0.13	±0.00	±0.05	±0.00	±0.01	±0.02	±0.00	±0.10	±1.27	±0.00
α_$t\bar{t}$GenPlusPS	±0.97	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.97	±0.00
Jet energy scale	±0.53	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.04	±0.48	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.46	±0.00
α_$t\bar{t}$ISRFSR	±0.36	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.36	±0.00
Jet energy resolution	±0.19	±0.00	±0.12	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.31	±0.00
α_syst$t\bar{t}$Xsec	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00
α_PileUp	±0.08	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.01	±0.00
α_ZGenerator	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00
α_WWGenerator	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy scale	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00
α_syst$Z$Xsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
α_systTplusXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00
Lumi	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 49: Breakdown of the dominant systematic uncertainties on background estimates in SR_3^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_3^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	1.22	0.00	0.02	0.00	0.00	0.00	0.00	0.04	0.00	0.08	1.08	0.00
Total background error	±0.88	±0.00	±0.13	±0.00	±0.05	±0.00	±0.01	±0.02	±0.00	±0.10	±0.88	±0.00
α_$t\bar{t}$GenPlusPS	±0.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.69	±0.00
Jet energy scale	±0.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.04	±0.34	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.33	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.33	±0.00
α_$t\bar{t}$ISRFSR	±0.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.24	±0.00
mu_$t\bar{t}$DF	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00
α_syst$t\bar{t}$Xsec	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00
Jet energy resolution	±0.10	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.22	±0.00
α_ZGenerator	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00
α_PileUp	±0.07	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.01	±0.00
α_WWGenerator	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
CellOut energy scale	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00
α_systTplusXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00
Lumi	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 50: Breakdown of the dominant systematic uncertainties on background estimates in SR_3^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_4^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	4.35	0.00	0.11	0.00	0.97	0.02	0.01	0.39	0.00	0.02	2.84	0.00
Total background error	±1.38	±0.00	±0.15	±0.00	±0.23	±0.02	±0.01	±0.11	±0.00	±0.02	±1.27	±0.00
α_$t\bar{t}$Generator	±0.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.73	±0.00
CellOut energy scale	±0.69	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.01	±0.00	±0.00	±0.61	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.62	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.62	±0.00
Jet energy scale	±0.49	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.02	±0.00	±0.00	±0.37	±0.00
α_syst$t\bar{t}$Xsec	±0.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.28	±0.00
Jet energy resolution	±0.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.26	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.18	±0.00	±0.00	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_PileUp	±0.17	±0.00	±0.11	±0.00	±0.02	±0.00	±0.00	±0.02	±0.00	±0.00	±0.07	±0.00
α_trigger	±0.13	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.01	±0.00	±0.00	±0.09	±0.00
α_$t\bar{t}$ISRFSR	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.13	±0.00
α_$t\bar{t}$PartonShower	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.11	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00
α_systWWXsec	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±0.04	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.04	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00
α_systWtXsec	±0.02	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 51: Breakdown of the dominant systematic uncertainties on background estimates in SR_4^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_4^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	4.09	0.00	0.11	0.00	0.97	0.02	0.01	0.39	0.00	0.02	2.59	0.00
Total background error	±1.07	±0.00	±0.15	±0.00	±0.23	±0.02	±0.01	±0.11	±0.00	±0.02	±0.98	±0.00
α_$t\bar{t}$Generator	±0.66	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.66	±0.00
CellOut energy scale	±0.63	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.01	±0.00	±0.00	±0.55	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.56	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.56	±0.00
Jet energy scale	±0.46	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.02	±0.00	±0.00	±0.33	±0.00
mu_$t\bar{t}$DF	±0.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.43	±0.00
α_syst$t\bar{t}$Xsec	±0.26	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.26	±0.00
Jet energy resolution	±0.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.24	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.18	±0.00	±0.00	±0.00	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_PileUp	±0.17	±0.00	±0.11	±0.00	±0.02	±0.00	±0.00	±0.02	±0.00	±0.00	±0.06	±0.00
α_trigger	±0.12	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.01	±0.00	±0.00	±0.08	±0.00
α_$t\bar{t}$ISRFSR	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.11	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$PartonShower	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00
α_systTplusXsec	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00
Lumi	±0.04	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.03	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00
α_systWtXsec	±0.02	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 52: Breakdown of the dominant systematic uncertainties on background estimates in SR_4^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_5^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	7.54	0.00	0.41	0.00	1.91	0.02	0.23	0.68	0.00	0.01	4.28	0.00
Total background error	±4.29	±0.00	±0.39	±0.01	±1.46	±0.02	±0.25	±0.17	±0.00	±0.01	±3.98	±0.00
α_$t\bar{t}$Generator	±3.62	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±3.62	±0.00
α_WWGenerator	±1.43	±0.00	±0.00	±0.00	±1.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±0.94	±0.00	±0.00	±0.01	±0.04	±0.00	±0.01	±0.03	±0.00	±0.00	±1.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.74	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.74	±0.00
α_PileUp	±0.73	±0.00	±0.07	±0.00	±0.03	±0.01	±0.03	±0.01	±0.00	±0.00	±0.71	±0.00
CellOut energy resolution	±0.66	±0.00	±0.00	±0.00	±0.12	±0.00	±0.03	±0.01	±0.00	±0.00	±0.50	±0.00
CellOut energy scale	±0.47	±0.00	±0.00	±0.00	±0.05	±0.00	±0.01	±0.02	±0.00	±0.00	±0.43	±0.00
α_syst$t\bar{t}$Xsec	±0.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.43	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.37	±0.00	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.25	±0.00	±0.00	±0.00	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_trigger	±0.23	±0.00	±0.01	±0.00	±0.06	±0.00	±0.01	±0.02	±0.00	±0.00	±0.13	±0.00
α_WZGenerator	±0.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.22	±0.00	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$PartonShower	±0.17	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.17	±0.00
α_systTplusXsec	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00
Jet energy scale	±0.14	±0.00	±0.02	±0.00	±0.06	±0.00	±0.02	±0.01	±0.00	±0.00	±0.07	±0.00
α_JVF	±0.12	±0.00	±0.02	±0.01	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.06	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.10	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±0.09	±0.00	±0.01	±0.00	±0.05	±0.00	±0.01	±0.02	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.08	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 53: Breakdown of the dominant systematic uncertainties on background estimates in SR_5^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_5^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	8.26	0.00	0.41	0.00	1.91	0.02	0.23	0.68	0.00	0.01	5.00	0.00
Total background error	±4.44	±0.00	±0.39	±0.01	±1.45	±0.02	±0.25	±0.17	±0.00	±0.01	±4.19	±0.00
α_$t\bar{t}$Generator	±4.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±4.22	±0.00
α_WWGenerator	±1.42	±0.00	±0.00	±0.00	±1.42	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±1.10	±0.00	±0.00	±0.01	±0.04	±0.00	±0.01	±0.03	±0.00	±0.00	±1.16	±0.00
mu_$t\bar{t}$DF	±0.87	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.87	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.86	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.86	±0.00
α_PileUp	±0.84	±0.00	±0.07	±0.00	±0.03	±0.01	±0.03	±0.01	±0.00	±0.00	±0.82	±0.00
CellOut energy resolution	±0.74	±0.00	±0.00	±0.00	±0.12	±0.00	±0.03	±0.01	±0.00	±0.00	±0.59	±0.00
CellOut energy scale	±0.54	±0.00	±0.00	±0.00	±0.05	±0.00	±0.01	±0.02	±0.00	±0.00	±0.50	±0.00
α_syst$t\bar{t}$Xsec	±0.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.50	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.37	±0.00	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.25	±0.00	±0.00	±0.00	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_trigger	±0.25	±0.00	±0.01	±0.00	±0.06	±0.00	±0.01	±0.02	±0.00	±0.00	±0.15	±0.00
α_WZGenerator	±0.22	±0.00	±0.00	±0.00	±0.00	±0.00	±0.22	±0.00	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$PartonShower	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.20	±0.00
α_systTplusXsec	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00	±0.00	±0.00	±0.00
Jet energy scale	±0.15	±0.00	±0.02	±0.00	±0.06	±0.00	±0.02	±0.01	±0.00	±0.00	±0.08	±0.00
α_JVF	±0.13	±0.00	±0.02	±0.01	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.09	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±0.09	±0.00	±0.01	±0.00	±0.05	±0.00	±0.01	±0.02	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.08	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 54: Breakdown of the dominant systematic uncertainties on background estimates in SR_5^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_6^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	3.07	0.01	0.41	0.00	1.23	0.02	0.21	0.42	0.00	0.00	0.76	0.00
Total background error	±1.51	±0.01	±0.39	±0.01	±0.71	±0.03	±0.24	±0.12	±0.00	±0.00	±1.21	±0.00
α_$t\bar{t}$Generator	±1.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.11	±0.00
α_WWGenerator	±0.65	±0.00	±0.00	±0.00	±0.65	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.37	±0.00	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±0.35	±0.00	±0.00	±0.00	±0.12	±0.00	±0.00	±0.03	±0.00	±0.00	±0.20	±0.00
Jet energy scale	±0.29	±0.00	±0.02	±0.00	±0.13	±0.00	±0.00	±0.03	±0.00	±0.00	±0.10	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.25	±0.00
α_WZGenerator	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.20	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_PileUp	±0.18	±0.00	±0.07	±0.00	±0.02	±0.01	±0.05	±0.02	±0.00	±0.00	±0.17	±0.00
CellOut energy scale	±0.16	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.01	±0.00	±0.00	±0.14	±0.00
CellOut energy resolution	±0.13	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.01	±0.00	±0.00	±0.23	±0.00
α_$t\bar{t}$ISRFSR	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.13	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.00	±0.00
α_trigger	±0.09	±0.00	±0.01	±0.00	±0.04	±0.00	±0.01	±0.01	±0.00	±0.00	±0.02	±0.00
α_systWtXsec	±0.08	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$t\bar{t}$Xsec	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.08	±0.00
Lumi	±0.06	±0.00	±0.01	±0.00	±0.03	±0.00	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.06	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$PartonShower	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00
α_JVF	±0.03	±0.00	±0.02	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$DF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 55: Breakdown of the dominant systematic uncertainties on background estimates in SR_6^{DF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_6^{DF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	3.34	0.01	0.41	0.00	1.23	0.02	0.21	0.42	0.00	0.00	1.03	0.00
Total background error	±1.79	±0.01	±0.39	±0.01	±0.71	±0.03	±0.24	±0.12	±0.00	±0.00	±1.56	±0.00
α_$t\bar{t}$Generator	±1.51	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.51	±0.00
α_WWGenerator	±0.64	±0.00	±0.00	±0.00	±0.64	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±0.42	±0.00	±0.00	±0.00	±0.12	±0.00	±0.00	±0.03	±0.00	±0.00	±0.27	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.37	±0.00	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.35	±0.00
Jet energy scale	±0.33	±0.00	±0.02	±0.00	±0.14	±0.00	±0.00	±0.03	±0.00	±0.00	±0.14	±0.00
mu_$t\bar{t}$DF	±0.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.28	±0.00
α_PileUp	±0.24	±0.00	±0.07	±0.00	±0.02	±0.01	±0.05	±0.02	±0.00	±0.00	±0.23	±0.00
CellOut energy resolution	±0.22	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.01	±0.00	±0.00	±0.32	±0.00
α_WZGenerator	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy scale	±0.20	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.01	±0.00	±0.00	±0.18	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.20	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.14	±0.00
α_syst$t\bar{t}$Xsec	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00
α_trigger	±0.10	±0.00	±0.01	±0.00	±0.04	±0.00	±0.01	±0.01	±0.00	±0.00	±0.03	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.08	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Lumi	±0.06	±0.00	±0.01	±0.00	±0.03	±0.00	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.06	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$PartonShower	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00
α_JVF	±0.03	±0.00	±0.02	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.02	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 56: Breakdown of the dominant systematic uncertainties on background estimates in SR_6^{DF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_1^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	9.92	0.00	0.00	0.00	0.08	0.00	0.01	0.19	0.00	0.77	8.87	0.00
Total background error	±3.94	±0.00	±0.00	±0.00	±0.09	±0.01	±0.09	±0.07	±0.00	±0.90	±3.70	±0.00
$\alpha_t\bar{t}$GenPlusPS	±2.83	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±2.83	±0.00
Jet energy scale	±2.04	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.03	±0.00	±0.26	±1.73	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±1.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.04	±0.00
α_syst$t\bar{t}$Xsec	±0.89	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.89	±0.00
$\alpha_t\bar{t}$ISRFSR	±0.83	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.83	±0.00
α_ZGenerator	±0.77	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.77	±0.00	±0.00
Jet energy resolution	±0.33	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.02	±0.00	±0.09	±0.22	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.24	±0.00	±0.00
α_JVF	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.12	±0.00
CellOut energy scale	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.15	±0.00
α_syst$Z$Xsec	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00
α_PileUp	±0.10	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.04	±0.04	±0.00
α_WZGenerator	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.06	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.04	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00
Lumi	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.02	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
CellOut energy resolution	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.28	±0.30	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_FakesSyst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 57: Breakdown of the dominant systematic uncertainties on background estimates in SR_1^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_1^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	7.25	0.00	0.00	0.00	0.08	0.00	0.01	0.19	0.00	0.77	6.20	0.00
Total background error	±2.49	±0.00	±0.00	±0.00	±0.09	±0.01	±0.09	±0.07	±0.00	±0.90	±2.25	±0.00
$\alpha_t\bar{t}$GenPlusPS	±1.97	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.97	±0.00
Jet energy scale	±1.50	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.03	±0.00	±0.26	±1.20	±0.00
mu_$t\bar{t}$SF	±0.83	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.83	±0.00
α_ZGenerator	±0.76	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.76	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.73	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.73	±0.00
α_syst$t\bar{t}$Xsec	±0.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.61	±0.00
$\alpha_t\bar{t}$ISRFSR	±0.53	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.53	±0.00
Jet energy resolution	±0.26	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.02	±0.00	±0.09	±0.15	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.24	±0.00	±0.00
α_syst$Z$Xsec	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00
α_JVF	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.09	±0.00
CellOut energy scale	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.10	±0.00
α_WZGenerator	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00
α_PileUp	±0.09	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.04	±0.03	±0.00
CellOut energy resolution	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.27	±0.21	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.06	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.04	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00
Lumi	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.02	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_FakesSyst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 58: Breakdown of the dominant systematic uncertainties on background estimates in SR_1^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_2^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	8.34	0.00	0.10	0.00	0.07	0.00	0.01	0.23	0.00	0.72	7.20	0.00
Total background error	±2.40	±0.00	±0.33	±0.00	±0.11	±0.00	±0.14	±0.08	±0.00	±0.77	±2.08	±0.00
Jet energy scale	±1.43	±0.00	±0.14	±0.00	±0.02	±0.00	±0.00	±0.03	±0.00	±0.01	±1.24	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.97	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.97	±0.00
α_syst$t\bar{t}$Xsec	±0.72	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.72	±0.00
α_$t\bar{t}$ISRFSR	±0.72	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.72	±0.00
α_ZGenerator	±0.72	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.72	±0.00	±0.00
CellOut energy resolution	±0.69	±0.00	±0.19	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.02	±0.55	±0.00
CellOut energy scale	±0.54	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.53	±0.00
Jet energy resolution	±0.48	±0.00	±0.19	±0.00	±0.01	±0.00	±0.00	±0.02	±0.00	±0.03	±0.34	±0.00
α_$t\bar{t}$GenPlusPS	±0.26	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.26	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.25	±0.00	±0.00
α_PileUp	±0.14	±0.00	±0.08	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.03	±0.17	±0.00
α_WZGenerator	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.12	±0.00
α_syst$Z$Xsec	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.08	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00
Lumi	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.02	±0.00	±0.00
α_systWtXsec	±0.02	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 59: Breakdown of the dominant systematic uncertainties on background estimates in SR_2^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_2^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	6.16	0.00	0.10	0.00	0.07	0.00	0.01	0.23	0.00	0.72	5.03	0.00
Total background error	±1.48	±0.00	±0.33	±0.00	±0.11	±0.00	±0.14	±0.08	±0.00	±0.76	±1.10	±0.00
Jet energy scale	±1.05	±0.00	±0.14	±0.00	±0.02	±0.00	±0.00	±0.03	±0.00	±0.01	±0.86	±0.00
α_ZGenerator	±0.71	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.71	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.68	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.68	±0.00
mu_$t\bar{t}$SF	±0.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.67	±0.00
CellOut energy resolution	±0.52	±0.00	±0.19	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.02	±0.38	±0.00
α_syst$t\bar{t}$Xsec	±0.50	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.50	±0.00
α_$t\bar{t}$ISRFSR	±0.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.44	±0.00
Jet energy resolution	±0.38	±0.00	±0.19	±0.00	±0.01	±0.00	±0.00	±0.02	±0.00	±0.03	±0.23	±0.00
CellOut energy scale	±0.37	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.37	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.25	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.25	±0.00	±0.00
α_$t\bar{t}$GenPlusPS	±0.18	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.18	±0.00
α_WZGenerator	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00	±0.14	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00
α_JVF	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.08	±0.00
α_PileUp	±0.09	±0.00	±0.08	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.03	±0.12	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.08	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00
Lumi	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.02	±0.00	±0.00
α_systWtXsec	±0.02	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 60: Breakdown of the dominant systematic uncertainties on background estimates in SR_2^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_3^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	3.85	0.00	0.00	0.00	0.00	0.00	0.01	0.12	0.00	0.72	2.98	0.00
Total background error	±1.35	±0.00	±0.04	±0.00	±0.06	±0.01	±0.06	±0.05	±0.00	±0.78	±1.07	±0.00
α_ZGenerator	±0.72	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.72	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.62	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.62	±0.00
α_$t\bar{t}$ISRFSR	±0.57	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.57	±0.00
Jet energy scale	±0.55	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.44	±0.00
α_syst$t\bar{t}$Xsec	±0.30	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.30	±0.00
Jet energy resolution	±0.29	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.08	±0.35	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.24	±0.00	±0.00
CellOut energy resolution	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.15	±0.00
α_syst$Z$Xsec	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00
α_$t\bar{t}$GenPlusPS	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00
CellOut energy scale	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00
α_JVF	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.04	±0.00
α_WWGenerator	±0.06	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00
α_PileUp	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.03	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00
Lumi	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 61: Breakdown of the dominant systematic uncertainties on background estimates in SR_3^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_3^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	2.95	0.00	0.00	0.00	0.00	0.00	0.01	0.12	0.00	0.72	2.08	0.00
Total background error	±0.99	±0.00	±0.04	±0.00	±0.06	±0.01	±0.06	±0.05	±0.00	±0.78	±0.63	±0.00
α_ZGenerator	±0.72	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.72	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.43	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.43	±0.00
Jet energy scale	±0.42	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.30	±0.00
α_$t\bar{t}$ISRFSR	±0.35	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.35	±0.00
mu_$t\bar{t}$SF	±0.28	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.28	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.24	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.24	±0.00	±0.00
α_syst$t\bar{t}$Xsec	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.21	±0.00
Jet energy resolution	±0.18	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.08	±0.24	±0.00
α_syst$Z$Xsec	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00
CellOut energy resolution	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.10	±0.00
α_$t\bar{t}$GenPlusPS	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00
α_WWGenerator	±0.06	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00	±0.06	±0.00	±0.00	±0.00	±0.00	±0.00
α_PileUp	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.02	±0.00
α_JVF	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.03	±0.00
CellOut energy scale	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.03	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.03	±0.00	±0.00	±0.00	±0.00
Lumi	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWWXsec	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 62: Breakdown of the dominant systematic uncertainties on background estimates in SR_3^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_4^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	6.00	0.01	0.08	0.03	0.92	0.83	0.74	0.32	0.00	0.11	2.95	0.00
Total background error	±1.64	±0.02	±0.13	±0.03	±0.53	±0.47	±0.50	±0.09	±0.53	±0.23	±1.09	±0.00
Jet energy scale	±0.71	±0.00	±0.00	±0.00	±0.06	±0.00	±0.05	±0.01	±0.51	±0.00	±0.07	±0.00
α_$t\bar{t}$Generator	±0.62	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.62	±0.00
γ_shape_mcstat_$t\bar{t}$_SR_obs_BDTG_bin_0	±0.61	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.61	±0.00
CellOut energy scale	±0.56	±0.00	±0.00	±0.00	±0.02	±0.01	±0.03	±0.00	±0.12	±0.01	±0.43	±0.00
α_PileUp	±0.47	±0.00	±0.10	±0.00	±0.04	±0.05	±0.08	±0.03	±0.03	±0.06	±0.24	±0.00
α_WWGenerator	±0.46	±0.00	±0.00	±0.00	±0.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.44	±0.00	±0.00	±0.00	±0.00	±0.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.42	±0.00	±0.00	±0.00	±0.00	±0.00	±0.42	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$t\bar{t}$Xsec	±0.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.29	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.20	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±0.20	±0.01	±0.00	±0.00	±0.11	±0.08	±0.12	±0.00	±0.08	±0.19	±0.24	±0.00
α_trigger	±0.18	±0.00	±0.00	±0.00	±0.03	±0.03	±0.02	±0.01	±0.00	±0.00	±0.09	±0.00
CellOut energy resolution	±0.15	±0.01	±0.00	±0.01	±0.06	±0.00	±0.07	±0.02	±0.00	±0.01	±0.14	±0.00
α_$t\bar{t}$PartonShower	±0.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.12	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.12	±0.00	±0.00	±0.00	±0.00	±0.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00
Lumi	±0.09	±0.00	±0.00	±0.00	±0.03	±0.02	±0.02	±0.01	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.08	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.06	±0.00	±0.04	±0.00	±0.01	±0.04	±0.03	±0.00	±0.00	±0.01	±0.01	±0.00
α_systWZXsec	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$SR$_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00
α_systWWXsec	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.04	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00
α_systWtXsec	±0.02	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$_$VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$t\bar{t}$ISRFSR	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_$Fakes$Syst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes$_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}$_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 63: Breakdown of the dominant systematic uncertainties on background estimates in SR_4^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_4^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	6.33	0.01	0.08	0.03	0.93	0.83	0.74	0.32	0.00	0.11	3.27	0.00
Total background error	±1.57	±0.02	±0.13	±0.03	±0.52	±0.47	±0.50	±0.09	±0.53	±0.23	±1.03	±0.00
Jet energy scale	±0.71	±0.00	±0.00	±0.00	±0.06	±0.00	±0.05	±0.01	±0.51	±0.00	±0.08	±0.00
$\alpha_t\bar{t}$Generator	±0.69	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.69	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.67	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.67	±0.00
CellOut energy scale	±0.60	±0.00	±0.00	±0.00	±0.02	±0.01	±0.03	±0.00	±0.11	±0.01	±0.47	±0.00
α_PileUp	±0.49	±0.00	±0.10	±0.00	±0.04	±0.05	±0.08	±0.03	±0.03	±0.06	±0.26	±0.00
mu_$t\bar{t}$SF	±0.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.46	±0.00
α_WWGenerator	±0.46	±0.00	±0.00	±0.00	±0.46	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.44	±0.00	±0.00	±0.00	±0.00	±0.44	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WZGenerator	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00	±0.41	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$t\bar{t}$Xsec	±0.32	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.32	±0.00
Jet energy resolution	±0.22	±0.01	±0.00	±0.00	±0.11	±0.08	±0.12	±0.00	±0.08	±0.19	±0.27	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.21	±0.00	±0.00	±0.00	±0.21	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00
α_trigger	±0.19	±0.00	±0.00	±0.00	±0.03	±0.02	±0.02	±0.01	±0.00	±0.00	±0.10	±0.00
CellOut energy resolution	±0.17	±0.01	±0.00	±0.01	±0.06	±0.00	±0.07	±0.02	±0.00	±0.01	±0.15	±0.00
$\alpha_t\bar{t}$PartonShower	±0.13	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.13	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.12	±0.00	±0.00	±0.00	±0.00	±0.12	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00
Lumi	±0.09	±0.00	±0.00	±0.00	±0.03	±0.02	±0.02	±0.01	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.08	±0.00	±0.08	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systTplusXsec	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.06	±0.00	±0.04	±0.00	±0.01	±0.04	±0.03	±0.00	±0.00	±0.01	±0.02	±0.00
α_systWZXsec	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00
α_systWWXsec	±0.05	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.04	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.02	±0.00	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.02	±0.00	±0.00
α_systWtXsec	±0.02	±0.00	±0.02	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
$\alpha_t\bar{t}$ISRFSR	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_FakesSyst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 64: Breakdown of the dominant systematic uncertainties on background estimates in SR_4^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_5^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	5.42	0.01	0.34	0.00	0.24	0.19	0.13	0.33	0.23	0.10	3.84	0.00
Total background error	±1.92	±0.01	±0.35	±0.00	±0.24	±0.21	±0.24	±0.10	±0.27	±0.13	±1.77	±0.00
$\alpha_t\bar{t}$Generator	±1.27	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.27	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.70	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.70	±0.00
CellOut energy scale	±0.63	±0.00	±0.00	±0.00	±0.02	±0.01	±0.00	±0.01	±0.00	±0.00	±0.61	±0.00
CellOut energy resolution	±0.56	±0.00	±0.00	±0.00	±0.00	±0.01	±0.06	±0.01	±0.00	±0.00	±0.50	±0.00
α_PileUp	±0.50	±0.00	±0.02	±0.00	±0.00	±0.00	±0.08	±0.00	±0.14	±0.01	±0.31	±0.00
α_syst$t\bar{t}$Xsec	±0.38	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.38	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.34	±0.00	±0.34	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00	±0.00	±0.00
Jet energy resolution	±0.23	±0.00	±0.00	±0.00	±0.13	±0.01	±0.01	±0.04	±0.00	±0.01	±0.31	±0.00
α_WZGenerator	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.20	±0.00	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.17	±0.00	±0.00	±0.00	±0.17	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_trigger	±0.16	±0.00	±0.01	±0.00	±0.01	±0.01	±0.00	±0.01	±0.01	±0.00	±0.12	±0.00
$\alpha_t\bar{t}$PartonShower	±0.15	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.15	±0.00
Jet energy scale	±0.14	±0.00	±0.00	±0.00	±0.01	±0.01	±0.01	±0.00	±0.00	±0.00	±0.16	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.11	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00
α_systTplusXsec	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.07	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00
Lumi	±0.04	±0.00	±0.01	±0.00	±0.01	±0.01	±0.00	±0.01	±0.01	±0.00	±0.00	±0.00
α_syst$Z$Xsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.03	±0.00	±0.00	±0.00	±0.04	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
mu_$t\bar{t}$SF	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
$\alpha_t\bar{t}$ISRFSR	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_FakesSyst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 65: Breakdown of the dominant systematic uncertainties on background estimates in SR_5^{SF} before the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.

Uncertainty of channel	SR_5^{SF}	tZ	Wt	H	WW	ZZ	WZ	$t\bar{t}W + t\bar{t}Z + t\bar{t}WW$	DY	Z	$t\bar{t}$	$Fakes$
Total background expectation	5.50	0.01	0.34	0.00	0.24	0.19	0.13	0.33	0.23	0.10	3.92	0.00
Total background error	±1.78	±0.01	±0.35	±0.00	±0.24	±0.21	±0.24	±0.10	±0.27	±0.13	±1.63	±0.00
$\alpha_t\bar{t}$Generator	±1.29	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±1.29	±0.00
γ_shape_mcstat_$t\bar{t}_SR$_obs_BDTG_bin_0	±0.71	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.71	±0.00
CellOut energy scale	±0.64	±0.00	±0.00	±0.00	±0.02	±0.01	±0.00	±0.01	±0.00	±0.00	±0.62	±0.00
CellOut energy resolution	±0.56	±0.00	±0.00	±0.00	±0.00	±0.01	±0.06	±0.01	±0.00	±0.00	±0.50	±0.00
mu_$t\bar{t}$SF	±0.54	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.54	±0.00
α_PileUp	±0.51	±0.00	±0.02	±0.00	±0.00	±0.00	±0.08	±0.00	±0.14	±0.01	±0.31	±0.00
α_syst$t\bar{t}$Xsec	±0.39	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.39	±0.00
γ_shape_mcstat_Wt_SR_obs_BDTG_bin_0	±0.34	±0.00	±0.34	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
Jet energy resolution	±0.23	±0.00	±0.00	±0.00	±0.13	±0.01	±0.01	±0.04	±0.00	±0.01	±0.31	±0.00
γ_shape_mcstat_DY_SR_obs_BDTG_bin_0	±0.23	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.23	±0.00	±0.00	±0.00
α_WZGenerator	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZZGenerator	±0.20	±0.00	±0.00	±0.00	±0.00	±0.20	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_WWGenerator	±0.17	±0.00	±0.00	±0.00	±0.17	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_trigger	±0.16	±0.00	±0.01	±0.00	±0.01	±0.01	±0.00	±0.01	±0.01	±0.00	±0.12	±0.00
$\alpha_t\bar{t}$PartonShower	±0.16	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.16	±0.00
Jet energy scale	±0.15	±0.00	±0.00	±0.00	±0.01	±0.01	±0.01	±0.00	±0.00	±0.00	±0.16	±0.00
γ_shape_mcstat_WW_SR_obs_BDTG_bin_0	±0.11	±0.00	±0.00	±0.00	±0.11	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_ZGenerator	±0.10	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.10	±0.00	±0.00
γ_shape_mcstat_Z_SR_obs_BDTG_bin_0	±0.09	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.09	±0.00	±0.00
α_systTplusXsec	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_SR_obs_BDTG_bin_0	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWtXsec	±0.07	±0.00	±0.07	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_SR_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_SR$_obs_BDTG_bin_0	±0.05	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.05	±0.00	±0.00	±0.00	±0.00
Lumi	±0.04	±0.00	±0.01	±0.00	±0.01	±0.01	±0.00	±0.01	±0.01	±0.00	±0.00	±0.00
$\alpha_t\bar{t}$ISRFSR	±0.04	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.04	±0.00
α_syst$Z$Xsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00
α_systWWXsec	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systZZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_systWZXsec	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00
α_JVF	±0.01	±0.00	±0.00	±0.00	±0.01	±0.00	±0.03	±0.00	±0.00	±0.00	±0.04	±0.00
α_systtZXsec	±0.01	±0.01	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_SR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_SR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}W + t\bar{t}Z + t\bar{t}WW_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Z_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
α_FakesSyst	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_ZZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_Wt_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_tZ_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_H_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$Fakes_CR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_$t\bar{t}_VR$_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_DY_CR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WW_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00
γ_shape_mcstat_WZ_VR_obs_BDTG_bin_0	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00	±0.00

Table 66: Breakdown of the dominant systematic uncertainties on background estimates in SR_5^{SF} after the fit. Note that the individual uncertainties can be correlated, and do not necessarily add up quadratically to the total background uncertainty. The percentages show the size of the uncertainty relative to the total expected background.